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REPORT

OF THE

MASSACHUSETTS STATE COMMISSIONER

TO THE

CENTENNIAL EXHIBITION

AT

PHILADELPHIA.

1876.

BOSTON:
ALBERT J. WRIGHT, STATE PRINTER,
CORNER MILK AND FEDERAL STREETS.
1877.

Massachusetts, Commission, Centennial
exhibition, 1876

25-806

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REPORT.

To His Excellency the Governor and the Honorable Council.

Your Commissioner appointed under the Resolve of the General Court (1875, chap. 71), authorizing the Governor and Council "to take such steps, and do all such things as to them shall seem proper, for securing at the Exhibition at Philadelphia, a due representation of the different arts, industries and institutions of the Commonwealth," has the honor to report as follows:—

Having received his commission from the Governor, in accordance with the vote of the Council, passed September 10, 1875, advising "the appointment of Leverett Saltonstall to be Commissioner and Hamilton Alonzo Hill and Joe V. Meigs to be Associate Commissioners to the Centennial Exhibition at Philadelphia," the undersigned, and the gentlemen named as his associates, entered at once upon the work assigned them. The duty of the Commissioners was twofold:—

1. To secure a due representation of the public institutions and interests of the State.

Reclass 7-21-39

[illegible] citizens and [illegible] in [illegible] a proper [illegible] industries which [illegible]

[illegible] between the [illegible] and the first day [illegible] their space [illegible] an important duty [illegible] the attention of our citizens who [illegible] interest in the [illegible] Being informed by the [illegible] that at that date, September [illegible], only [illegible] applications had been entered, and urged by him to lose not a day in pushing forward the work, your Commissioners sent circulars to hundreds of individuals, firms and corporations; employed canvassers in various parts of the State; distributed centennial documents, and called meetings of the various manufacturers and merchants for consultation and advice. Efforts were made to induce them to secure space, and in many instances to make joint exhibits in their several branches of industry. Thus the manufacturers of cotton in its different forms, of woollen, of carpets, of glass, of paper and other goods, were at various times assembled in the rooms of the Commission.

Photographs of the more prominent features of the Vienna Exhibition were imported, and artists were called in that they might be thus encouraged to execute designs for the proper installation of their exhibits.

The work of obtaining satisfactory space for the various applicants was undertaken, and in nearly all cases where timely application was made through the Commission, it was secured, though in some instances only after much correspondence and frequent personal interviews with the officers of the departments in Philadelphia. Space was often abandoned after it had been assigned, and the services of the Commission were found to be important in substituting other exhibitors in the same line of business, who had not before been able to secure space. The number of exhibitors from Massachusetts was thus greatly increased, and exclusive of those in the boot, shoe and leather department (who were, according to an understanding with the Centennial Board, not represented by this Commission), it could not have been less than 1,500.

The work of transportation required and received much attention from the Commission. The managers at Philadelphia having undertaken the very great and laborious duty of sending instructions to the individual exhibitors for forwarding their packages, there would have been much confusion but for the aid which the Commission was enabled to render them. It being impossible to obtain a sufficient number of the peculiar labels for cases and parcels, the Commission had a large supply engraved and printed, by permission, and thus much loss of time was avoided. It was the constant endeavor of the Commission to render the citizens of Massachusetts every possible service on any matter which had even the remotest relation to the exhibition ; and it is a source of much satisfaction to know that in no instance was any application made for advice or assistance, however foreign it might seem to the duties required of the Commission, which was not, as far as possible, granted.

The great work, however, before the Commission was the organization of a proper system of exhibiting the great educational, scientific and charitable institutions and interests of the State, the collection and proper arrangement of its mercantile, marine and fishing interests, and a scientific and practical exhibit of its agriculture ; and to these subjects much care and anxious thought were devoted.

DEPARTMENT OF EDUCATION AND SCIENCE.

The Commission, with the approval of the Governor and Council, requested the Board of Education to prepare and present a scheme for the exhibit of their important department, whereupon a committee was appointed by the Board, consisting of Gardiner Green Hubbard Esq., Rev. Dr. A. A. Miner and Joseph White, Esq., secretary of the board. These gentlemen met the Commission, and with Mr. John D. Philbrick, who had been selected by them as their agent, presented an acceptable scheme ; and the sum of $7,500 (subsequently raised to $10,000) was assigned to carry it out, under the general supervision of the Commission.

It may be proper here to state, that for the furtherance of the important work to be performed by various centennial organizations, the Commission, with the consent of the Governor and Council, engaged the house No. 25 Pemberton Square, in which these bodies were invited to locate their offices. In accordance with this invitation, the U. S. Commissioner and the Centennial Board, the "Women's Centennial Committee," and the subcommittee of the Board of Education occupied three floors of the building, while another floor was used for the offices of this Commission. This arrangement was of great service to all who were interested in the exhibition, and convenience to the Commission in the transaction of its business. Work was commenced by Mr. Philbrick with great zeal; circulars relating to many subjects covered by the proposed plan were issued to towns, colleges, schools and individuals, containing information and suggestions as to what was required, and directions for carrying out his designs. Mr. Philbrick's knowledge of what ought to be accomplished in this department, derived from his experience at the Vienna Exhibition, rendered his services of the highest value, and the result proved the wisdom of employing him for this important post. Mr. Philbrick's services having been demanded in another field, he resigned his position on the 1st of March, when Mr. Percival D. Richards, who had been his assistant, was made the agent of the board. Mr. Richards evinced the utmost zeal and fidelity in carrying out the work designed by Mr. Philbrick, as well as in the execution of whatever, after his resignation, became necessary for the completion of this valuable and instructive exhibit.

Mr. and Mrs. Richards had the personal supervision of the arrangement of the space assigned the State of Massachusetts for its educational and scientific exhibits. This space was located in the east gallery of the Main Building, occupying the whole gallery with the exception of the central space assigned to Messrs. Hook & Hastings for their organs, and consisted of six rooms, which, together with the stairways and entrances, were devoted to the various branches of the exhibit, according to the requirements of each of them. One of these rooms was occupied by the Massachusetts Institute of Technology, another by the Worcester Free Institute and the New Bedford representative exhibit of the system of public instruction in the large towns and cities of the second rank in population.

In addition to the admirable collection prepared by the Board of Education, this exhibit was largely increased and enriched by the contribution of various educational, scientific and literary institutions, and by individual manufacturers and dealers in articles appertaining to education and science, and by special reports, with maps, charts, drawings and pictorial representations prepared expressly for the Commission by many of the state commissions and institutions, and which will be more fully noticed hereafter.

On the opening day, this department was ready for inspection, and was visited during the term of the exhibition by at least 130,000 people, most of whom came to this retired spot from no idle curiosity, but for the purpose of studying and making notes upon our system. France sent a large commission to examine and report upon our exhibit, who devoted much time to a careful inspection of our scholars' work, and employed copyists for several days upon the various exercises. The Japanese often visited our exhibit, and after examining schools in various parts of the Union, expressed a decided preference for those of the city of Boston. Prominent educators from all parts of the United States and from foreign countries visited our rooms and took a great interest in our exhibit. Among the foreign countries from which we had visitors were the following: Switzerland, Italy, Netherlands, Portugal, Austria, Sweden, Spain, France, Grand Duchy of Luxemburg, Norway, England, Hungary, Denmark, Russia, Belgium, Germany, Argentine Republic, Brazil, Chili, Cuba, India, British Burmah, Japan, China, New South Wales, Hawaii, Mexico, and the Department of Ontario.

In addition to the educational system, the Commission made exhibits of the various public institutions of Massachusetts, so far as was practicable; and to the end that these might be rendered as perfect as possible, the several boards and commissioners of the State were consulted and urged to undertake some special work for the proper exhibition of their respective departments. These suggestions were, in some cases, carefully carried out, and the necessary funds were assigned for the purpose, with the approval of the Governor and Council, while in others it was deemed impracticable, or at least uninstructive and therefore unnecessary. The special work done, or the sphere of public service occupied, by the various state boards, commissions and departments was exhibited in the form of documents and serial reports issued by them respectively, and from several of them were obtained reports and historical sketches or memoirs prepared specially for the occasion. Photographs, drawings, plans and descriptions of public institutions were prepared; maps, charts and statistical tables were made, conveying information in the plainest and most succinct form. Most of this work received from critics very great attention and careful study, and from the judges, in many instances, awards with highly commendatory reports.

Among the works so specially prepared for the Commission are the following:—

"A Summary of Seven Years' Work of the State Board of Health of Massachusetts. By W. L. Richardson, M. D." 8vo, pp. 61. The admirable plans of the *Brighton Abattoir* were also the work of this board. These plans were executed by Mr. Edward Dewson, and consisted of elevations, ground plans and vertical sections.

"History of the Bureau of Statistics of Labor of Massachusetts, and of Labor Legislation in that State from 1833 to 1876. Prepared (under the direction of Carroll D. Wright, Chief of the Bureau) by Chas. F. Pidgin." 8vo, pp. 101.

"Census System of Massachusetts for 1875. Edited and arranged for the Bureau of Statistics of Labor by Oren W. Weaver," also under Colonel Wright's direction. Quarto, pp. 164.

"History of the Massachusetts Insurance Department, including a Sketch of the Origin and Progress of Insurance, and of the Insurance Legislation of the State from 1780 to 1876. Prepared by Julius L. Clarke, late Insurance Commissioner of Massachusetts." 8vo, pp. 100.

"Historical Sketch." Prepared by the Board of Prison Commissioners, pp. 28, and a bird's-eye view, with elevations, of the State Reformatory Prison for Women, drawn by Mr. George Ropes, the architect.

"The Public Charities of Massachusetts during the Century ending January 1, 1876. By F. B. Sanborn, Chairman of the Board of State Charities." pp. 110.

"Section of Hoosac Mountain and Tunnel, with photographic views of working machinery, etc., and specimens of rock bored through." Prepared by Mr. Thomas Doane, engineer.

Bird's-eye view of the State Lunatic Hospital at Worcester.

Elevation plans, etc., of the Hospital for the Insane at Northampton.

State Hospital for the Insane at Danvers; very large bird's-eye view, with ground plans, elevations, drainage, ventilation and heating. Prepared by James F. Ellis, superintending architect.

Geological Map of the State and accompanying report (pp. 42). Prepared by Mr. W. O. Crosby, under the direction of Professor Hyatt of the Boston Society of Natural History, to which is appended a paper on the "Geology of the Nashua Valley, by Mr. L. S. Burbank." pp. 10.

Statistical maps of the State, showing density of population, ratio of illiteracy, proportion of native and foreign born population; births, deaths, and marriages; and excess of females, the materials for which were furnished by Colonel Wright of the Board of Statistics; also, railroads of the State; hypsometrics, or heights of stations above the sea-level, in all parts of the State, from data obtained from civil engineers connected with the railroads of the State; and climatologic and other statistical charts. These maps were executed for for the Commission by Mr. Ernest W. Bowditch, civil engineer of Boston.*

In addition to the above special works, there were exhibited on the shelves of this department complete series of the reports of the various boards and departments of the State, constituting a collection of exceptional value and interest.

The *Massachusetts Institute of Technology* occupied one of the rooms with an admirable display of its departments of mining, metallurgy, physics, chemistry, architecture, civil and mechanical engineering, its modes of teaching, students' work in each of these departments, specimens from its mining school, architectural designs, mechanical drawings and models, with thesis of each member of the class of 1876; 550 drawings in frames and in portfolios, and many other objects which illustrate the scope and thoroughness of the course of study pursued at that excellent institution; altogether presenting an exhibit complete in itself, in which every citizen of the State might take pride.

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* These maps attracted much attention, were considered of great value and interest, and ought to be carefully preserved for future reference. They are deposited in the State Library.

The *Worcester Free Institute*, in another room, with its drawings of buildings and workshops, specimens of work, models in wood and metal, drawings in civil and mechanical engineering, methods of instruction, examination papers and theses of the graduating class, the way in which pupils are taught to apply theory to practice and to become skilled workmen in all the various departments, as illustrated in the lecture-room, etc., made another most interesting and valuable exhibit.

The exhibits of our public schools consisted of 289 bound volumes of actual class-work, from 35 towns and cities of the State, representing schools of all grades and illustrating the various methods of teaching, and showing standards of scholarship actually attained in different grades and classes, among which, as types of the different results obtained, under the same system, in various parts of the State, ought especially to be mentioned the admirable exhibits of New Bedford, Greenfield, Newton and Boston. These exhibits consisted of text, reference and reading books, charts and apparatus, scholars' work, from the inventions of children from four to six years of age, illustrative of the Kindergarten system, and specimens of sewing done in grammar schools, up through all the various grades to the *normal*, the highest of our public schools; plans and photographs of school buildings, with full reports, statistics, etc. The six normal schools of the State were represented by photographs of exteriors and interiors of their respective buildings; by circulars, setting forth the courses of study pursued; and by reports, embodying historical accounts of these institutions, with results.

The admirable exhibit of art-education in Massachusetts is especially worthy of notice; free instruction in drawing having, in 1870, been made obligatory in public schools in all towns of over

10,000 inhabitants. The drawings of primary, grammar, and high schools, made under the general direction of Mr. Walter Smith, which covered the walls of three rooms and filled the portfolios, together with the excellent drawings and modellings by the pupils of the normal art-schools, excited the wonder and admiration of all who examined them.

The exhibits made by our colleges were, unfortunately, very deficient, and consisted principally of photographic views of the buildings, when they might have been rendered so valuable by showing in some succinct form, by means of charts or otherwise, their methods of instruction and courses of study, illustrated, as in the case of schools, by bound volumes of examination-papers and students' work. This deficiency was the one feature wanting to the perfect symmetry of our educational exhibit. An elevation of a college building, however attractive, is of no value as an exhibit on such an occasion.

The exhibits of the free libraries of the State were especially good, and attracted much attention. That in Boston, the largest in the country, with its 300,000 volumes, and lending more than 1,000,000 a year, at a loss of only $\frac{1}{100}$ of 1 per cent., was represented by seventeen volumes, giving its history, catalogues, and an account of its administration.

Our institutions for the blind, and the deaf and dumb, ought not to be omitted in this sketch of the educational exhibit. Several large volumes, printed in raised letters at the Perkins Institution, and specimens of pupils' work, with a complete set of reports of that institution; views of the exterior and interior of the deaf and dumb school in Boston, and reports specially prepared, giving a history of this institution and of the system of instruction adopted at the school, occupied a conspicuous place.

In this connection should be mentioned Prof. A. Graham Bell's "*Visible Speech*," in ten volumes and six charts. This gentleman also contributed greatly to the interest of this department by exhibiting his recent wonderful inventions and discoveries in telegraphy and telephony, with apparatus by which words spoken by the human voice are to be carried to great distances by means of the telegraph wire. Here, too, were the exquisitely beautiful and instructive astronomical drawings by Mr. L. Trouvelot, made at his physical observatory in Cambridge, illustrating the most interesting objects in that science, the result of ten years of telescopic observation and study, comprising views, as exact as it is possible to make them, of comets, clusters, nebulæ, meteors, solar spots and protuberances, eclipses, moon craters, planets, milky way, aurora borealis, etc.; also an astronomical lantern, the invention of the Rev. James Freeman Clarke, and by him contributed to this exhibit. Among other objects of great interest were an album of photographs and autographs of some of the living authors of Massachusetts, and a valuable chart of the world, showing the missions and statistics of the American Board of Commissioners for Foreign Missions.

Agricultural Exhibit.

In the preparation of the exhibit in the department of Agriculture, the Commission endeavored to enlist the sympathy and coöperation of the Secretary of the State Board of Agriculture, but, failing in this, was most fortunate in securing the assistance and advice of Dr. E. Lewis Sturtevant of Framingham, editor of the "Scientific Farmer." This gentleman volunteered his services, presented a scheme for an agricultural exhibit of the State, and devoted his entire time to it until, under his earnest and thoughtful study and supervision, it was erected in the space assigned for it in Agricultural Hall. Of course, Massachusetts cannot compare with the fertile soils of the West in the production of crops, and it was a very serious question how its farming interests could be satisfactorily presented by the side of those States so noted for their crops, minerals and woods. It would have been a great disappointment to our citizens not to have had an exhibit of our agriculture, and it is owing to the untiring zeal of Dr. Sturtevant that the Commission was enabled to accomplish so much in this department. The distinguishing feature of our agricultural exhibit was the presentation of scientific and statistical information by means of a large number of pictorial charts or diagrams, which were so placed as to be easily read, and so plain as to be readily understood by any intelligent examiner. These charts were designed to show the actual state of the agricultural interests of the Commonwealth, and the relative productiveness of farm labor as compared with the same in other States; the condition of the farming population as compared with that engaged in other industries; the relative value of the different breeds of cattle, etc. The design of this exhibit was to show the present condition of Massachusetts, and to furnish data for future comparison. It would have been easy to procure specimens of remarkable crops, or of vegetable growth, and the most improved implements, but all these would have had no special significance. The scheme as carried out, however, met with great acceptance. The regular correspondent of "The Nation," August 10, 1876, says: "The show from Massachusetts, indeed, is as perfect and extensive an exhibit as could be given in the space, of the character and variety of the products of the fields and forests of that State, accompanied by well-arranged statistical charts, which may almost be read as one runs, and surmounted by a trophy of local implements and utensils, which shows, in fact, what the possibilities of an international agricultural exhibition are, and how very much the present one falls short of what it might have achieved—but has not." It is much to be regretted that the whole scheme was cramped for lack of space, and thus fell short of the original design.

The charts were thirty-three in number, and were designed to show the climate of Massachusetts; crops as compared with those of other States; relations of production and consumption;

the value of intelligence and skill to the farmer; the advantages of Massachusetts as a farming State; statistical relations of agriculture; the social condition of farmers as illustrated by school facilities, annual earnings and funded surplus; the yield of native cows as compared with the yield of cows of improved breeds; and the statistics showing the progress and present condition of agricultural societies. These charts were all most skilfully and beautifully drawn under the direction of Mr. E. W. Bowditch.*

Above the charts were arranged a trophy composed of the tools and implements in common use by Massachusetts farmers, and through whose aid their material prosperity has been achieved. From this portion of the exhibit were carefully excluded all the most improved implements, which, although used on our better farms, have not yet come into general use. These implements were also designed to show the connection of agriculture with manufactures, as labels were prepared for each article, showing the capital invested in their manufacture, and the number and value of the article produced annually.

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* These charts ought to be sent to the Agricultural College, or some place of safety, for future reference.

As accessions to the exhibition, the panels of the cases were made of Massachusetts woods, each carefully labelled. On one table were presented photographic views of our agricultural college; on another, samples of fertilizers used in the State. As ornaments, and for practical use, were also exhibited cases of the insectivorous and useful birds of Massachusetts, represented in the act of seizing or devouring the insects prejudicial to agricultural economy. In other places appeared the state publications bearing on agriculture, photographs of improved breeds of cattle, etc., etc.

Marine Exhibition.

In laying out the work of representing the various arts and industries of the State, it was at an early day thought very desirable that the great marine interests, which have from the earliest period of its settlement so distinguished Massachusetts, should be displayed in some attractive and instructive form. A very perplexing question presented itself as to what that form should be and the agency by which this exhibit could be effected. Several gentlemen, distinguished for their knowledge and experience in marine affairs, were urged to prepare a scheme and undertake this work under the direction of the Commission, but in all cases without avail, and the project would have been abandoned but for the timely appearance of Mr. Henry W. Hunt of Boston, who cheerfully undertook its execution, and to his valuable aid the Commission is indebted for the attractive marine exhibit located in Machinery Hall. It consisted chiefly of models of the ocean and river craft of the State, from its settlement to the present time, used for purposes of commerce, the fisheries, yachting and pleasure, and some very interesting models of our historic vessels of war. These were obtained with much labor from their owners, and were, in many instances, in so dilapidated and unfinished a condition as to require the outlay of considerable time and money for their repair and completion. This was a difficult task, and demanded the careful supervision of an expert. It was designed to be a beautiful collection of all objects relating to the marine of the State, entirely unique in its character, and was said to have been the most complete and extensive marine exhibit ever made at any international exhibition. It was, at all times, surrounded by a crowd of admiring visitors, who found Captain Hunt always ready and willing to give a cheerful answer to their innumerable questions. Several awards were given to this exhibit. The thanks of the Commission are due to the many individuals and yacht-clubs, who so generously and promptly assisted the work by their valuable contributions.

ART.

At an early stage of its work, the Commission presented to the artists a scheme for holding in Boston, an exhibition of paintings, drawings, sculptures and architectural designs, with the view of assisting them to pay the expenses attending the transportation of their works to Philadelphia and of gratifying the people of the Commonwealth with an opportunity of viewing these works, which were to enter the International Exhibition and be placed by the side of the masterpieces of all nations. Not only the works of our living artists, but several of those of our older masters, were here brought together, and thus secured the interest and sympathy of the community and gained the object of their exhibition. While it is much to be regretted that some of our best artists refused to contribute their productions for competition, or even for exhibition, and that owners of many of the best masterpieces were unwilling to expose them to the various risks of transportation and exhibition, yet the collection, as a whole, reflected credit on the State, and those who labored so diligently in preparing it deserve the thanks of our people. This labor was undertaken and carried out by a committee of artists, with the advice and assistance of the Commission.

Cities and Towns.

Appreciating the importance of a complete exhibit of the various cities and towns of the Commonwealth, the Commission prepared a circular setting forth the manner in which it was desired that these representations should be made, which was sent to every city and town in the State. The special matters which they were urged to prepare were comprised under the following heads :—

1. A list of the city or town government, its committees and officers.
2. Pictures of the city as it is to-day, and as it was, numbered chronologically, and mounted upon the sheets of paper as above described.
3. Maps of the city as it is and as it was, chronologically arranged and numbered.
4. Pictures of scenery in and about the city. It is suggested that these views be taken from well-selected points, and accompanied by accurate descriptions. Photographers and artists may be able to give substantial aid in making this collection.

5. Views of public buildings used by the city, accompanied by plans and accurate descriptions.

6. Illustrations, with plans, of houses of worship, with brief descriptions, historical or otherwise. In most cases these would be furnished by the societies themselves.

7. Views of buildings of importance, with descriptions. Under this head would come *(a)* masonic temples, *(b)* historic and ancient buildings, *(c)* hotels, *(d)* manufactories, *(e)* buildings of architectural excellence.

8. Illustrations of reformatory institutions, accompanied by plans and descriptions.

9. Views of the asylums of various kinds within the city or town limits, whether of a private nature or controlled by the local government, together with plans and descriptions.

10. Views of hospitals, with plans and descriptions.

11. Pictorial representations of public parks, gardens, and places of recreation for children, with descriptions.

12. Illustrations and plans of engineering works undertaken by the city, or by private enterprise, such as *(a)* bridges, *(b)* water-works, *(c)* gas-works, *(d)* system of drainage, *(e)* system of removal of offal of all kinds.

13. Illustrations and plans of school-houses, their situation, with descriptions, accompanied by a statistical chart of schools, showing the school system and its results. These will be in addition to the educational exhibits of the State.

14. Illustrations of your police system: *(a)* the police, *(b)* the prisons, *(c)* prison schools, *(d)* workhouses, *(e)* police implements, uniforms and vehicles, *(f)* industrial schools, etc.

15. Illustrations of your fire department: *(a)* its men, *(b)* its apparatus, *(c)* its houses, etc., accompanied by descriptions.

16. Illustrations of the uniforms, equipments, barracks, etc., of your military organizations, with descriptions.

17. A historic review of your city.

18. A chronological review of notable events which have occurred in your town or city within the past century.

19. Biographical sketches, with photographs of leading citizens.

20. Statistical representation of the arts, industries, trades, sciences and population.

Had the principal cities and towns complied with this request, the result would have been most gratifying, and would not only have rendered the exhibit of the Commonwealth of far greater value and interest, at the late exhibition, but for purposes of comparison on any future similar occasion, would have been of inestimable value. The only response to this circular was the beautiful volume of photographic views, with statistics, etc., from Salem, and the excellent map, with views, of Nantucket.

HISTORICAL EXHIBIT.

An historical department would seem to have been a most appropriate and interesting feature of the Centennial Exhibition, and for this purpose room was assigned in Memorial Hall, through the activity and zeal of Col. Frank M. Etting, a gentleman to whose unflagging devotion and skill the country is indebted for the restoration of Independence Hall and the collection of interesting historical objects gathered there. At the solicitation of Col. Etting, earnest appeals were made to our historical societies for contributions to this great historical exhibit, and it is a source of regret that this scheme was not carried out. Owing to the pressure for space in the Memorial Hall, this plan was materially altered, and the exhibition was arranged to be held in the Academy of Fine Arts in the city of Philadelphia, but under the auspices of the Centennial Commission. It was doubtless due to this change that the efforts of most of the societies were relaxed and finally abandoned. The Essex Institute of Salem, however, had already prepared a very complete representation, and persevered in presenting it for exhibition.

George M. Whipple, Esq., furnishes a brief report of this exhibit, which it is proper to insert here:—

"The Essex Institute, from its own collection and by loan from its friends, was enabled to send to the International Exhibition at Philadelphia a creditable exhibit of portraits, and other articles of historical interest and value. Portraits of Gov. Endicott, Gov. Leverett, Gov. Bradstreet, Sir Richard Saltonstall, Timothy Pickering and Manasseh Cutler were sent; also upwards of one hundred articles of interest, many of them once belonging to the early settlers and people well known in the annals of Salem, and now owned by the Essex Institute or its members.

"After having the same carefully packed and ready for transportation, it was ascertained, much to the regret of the society, that the collection could not be placed in Memorial Hall, where space was originally allowed for exhibits of the various historical societies of the country. Arrangements were finally made, however, to have the exhibit in the rooms of the Academy of Fine Arts, in the city of Philadelphia, but under the auspices of the Centennial Commission.

"Accordingly, the collection was sent to Philadelphia early in June, under the personal direction of a committee of the Institute, and carefully and appropriately arranged in glass cases made specially for the purpose. Among the more prominent articles in the collection may be named the duplicate charter of the Colony of Massachusetts Bay, brought over by Gov. Endicott; also the grant, or charter, brought by Roger Conant at the time of the settlement of Cape Anne and the removal to Salem; also several very valuable manuscripts. When the International Exhibition closed, the officers of the Academy of Fine Arts, and other prominent gentlemen of Philadelphia, asked as a favor that the Institute collection be allowed to remain awhile longer; this being granted, the articles are still on exhibition, but will be removed to Salem early in March. In the successful performance of this duty, much is due to the aid and encouragement rendered by Col. Leverett Saltonstall, the State Commissioner; to him the sincere thanks of the Institute are cheerfully given.

"The Institute also arranged a large quarto album (22 by 28 inches in size), illustrating the history of Salem by a series of photographs, cabinet size, 208 in number, and giving in print the principal events in the history of Salem from its settlement, also statistics of industries, public works, societies, charities, city officers, school system, etc., etc. The album was on exhibition in the Massachusetts Educational Department, in the main building on the centennial ground, and attracted much attention. An appropriation from the Ladies' Centennial Committee of Salem enabled the directors of the Institute to preserve this exhibit in an appropriate and attractive manner. The album is now deposited at the Institute rooms. A complete set of the publications of the Institute was placed in the Educational Department, also one set was on exhibition at the Academy of Fine Arts."

It would be very interesting, were it possible, to give an exact account of the number of Massachusetts exhibitors, the nature of their exhibits, as well as their comparative excellence and the awards given them. Owing to the fact that some applications were made directly to the authorities in Philadelphia, before the appointment of this Commission, that others were made through the Centennial Board,—indeed all of those in the Shoe and Leather Department,—and to the withdrawal of many parties after space had been assigned them, it has been impossible to obtain a complete list without referring to the books of the several departments at Philadelphia, which it has not yet been convenient to do. Probably all such information will be given by the Centennial Commission in their reports of the Exhibition. The number of applicants for space entered upon the books of this, the State Commission, the most of whose applications were made out and forwarded from its office, amounts to nearly 1,000, and it is believed that no less than 1,500 of our citizens manifested their interest in the Exhibition by showing, or offering to show, the products of their skill and labor within its walls. They represent nearly all the trades and avocations pursued among men; and the general excellence of the productions of our industry and skill, as shown at the Exhibition, has justified the claim of our citizens to an honorable position among the busy workers of the world. It may be interesting to note the relative numbers of applicants in the various callings as they present themselves upon the books of the Commission. A condensed list is appended, as follows:—

Machinery, 108; hardware and tools, 62; furniture, 69; chemicals, paints, oils, etc., 68; minerals and metals, 12; building improvements, heating, etc., 45; building materials, 4; railroad supplies, 19; firearms, ordnance, ammunition, 11; rubber goods, 8; agricultural works, implements, 19; agricultural products, 9; carriages and furniture, 19; fire-extinguishing and life-saving apparatus, 14; watches, watchmaking, and tools, 9; jewelry, 8; mathematical and philosophical instruments, 10; musical instruments, 28; dentistry, 4; pottery, 3; clothing, 31; carpets, 5; textiles, woollen, 20; cotton, 70; silk, 4; paper, 8; books and stationery, 29; food and fruits, 29; beverages, 3; arts (not including sculptors and painters), 80; architects, 25; stonework, 5; wood and woodwork, 8; painting, ornamental, etc., 5; education, 18; science, 6; social science, 3; civil engineering, 2; glass, 11; cordage, 5; marine objects, 12; miscellaneous, 102. This list does not include the exhibitors of boots, shoes, and leather, and of the machinery used in their manufacture, which were taken charge of by the Centennial Board,—of whom there were several hundred,—nor all of those whose contributions were comprised in the department of education and science, nor all of the artists whose works were exhibited under the auspices of the Artists' Committee. It is a matter of regret that it is impossible to state the number of awards that were made to the citizens of Massachusetts, and it is particularly so in relation to the public institutional exhibits of the Commonwealth. A large number, it is known, were given to the educational and scientific, to the agricultural and the marine exhibits of the State; but up to this time, notwithstanding that repeated efforts have been made by this Commission to procure them, they have not been received. Whether the pressure of work in the department of awards is so great as to cause the delay, or whether the awards have been sent to other parties who have not forwarded them to their proper destination, or not, is unknown. It has been the intention of the Commission to prepare a list of the awards given to our exhibitors, but owing to the fact that a very considerable number of them were omitted in the first publication of awards, and that many more were added by the Committee of Appeals, after the dissolution of the boards of judges, of which no account has been published, it is deemed inexpedient to give a partial list of them.

Among the various duties undertaken by the Commissioner for the honor of the State was that of the distribution to the foreign commissioners, thirty-nine in number, a collection of the reports of the several commissions and public boards and institutions of the Commonwealth, together with such special centennial reports as had been made for this Commission. These comprised a very large and valuable collection, and were received with many expressions of gratitude by all these representatives of foreign nations and colonial governments. Many valuable publications were received in return by the Commissioner, which have been deposited in the State Library, a catalogue of which is as follows:—

GREAT BRITAIN.—Official Catalogue of the British Section. Parts I. and II. London, 1876.

Victoria. Official Record of the Colony of. Melbourne, 1873.

—— Official Catalogue of Exhibits, etc. Melbourne, 1876.

—— Official Catalogue, etc., Victoria, Australia. Melbourne, 1876.

New South Wales. Progress and Resources. Sydney, 1876.

GREAT BRITAIN—Continued.

South Australia. History, Resources and Productions. By Wm. Harcus, Esq. Illustrated. London, 1876.

New Zealand. Official Hand-Book. By Sir Julius Vogel, K. C. M. G. London, 1876.

—— Geological Map of Island.

Australia, Tasmania and New Zealand. List of Seeds of Trees and Flowering Shrubs. By C. F. Creswell. Melbourne, 1876.

Canada. Notes on Iron Ores of, etc. By B. J. Harrington, B. A. 1874.

—— Descriptive Catalogue of Economical Minerals, etc. Montreal, 1876.

—— List of Publications on Geological Survey of. By A. B. C. Selwin, F. G. S. Montreal, 1873.

—— *Province of Ontario.* Catalogue of Exhibits in Educational Department. Toronto, 1876.

—— —— Educational Institutions. Toronto, 1876.

—— *Quebec.* Lunatic Asylum Report in French, and same in English. 1873.

—— *New Brunswick.* Woods and Minerals. By L. W. Bailey and Edw. Jack.

North-Western America. Notes on. By Alex. Caulfield Anderson. Montreal, 1876.

FRANCE.—Expositions Internationales. Philadelphia, 1876.

Œuvres d'Art et Produits Industriels. Paris, 1876.

Belgium.—Catalogue of Industrial Products and Works of Art. Brussels, 1876.

Switzerland.—International Exhibition, Philadelphia, 1876. Catalogue of objects exhibited by the Board Public Works, Canton of Berne.

Swiss Catalogue International Exhibition. Philadelphia, 1876.

Kanton Bern. Direction der Öffentlichen Bauten Statistik eines theiles der Kantonalen Bauverwaltung. 1875. Verfasser der Secretaer der Direction. Bern.

Swiss Unions. General Report of Young Merchants, etc. (German and English). Zurich, 1876.

—— Report of the Director of the Cantonal Observatory of Neuchatel on the Competitive Trial of Chronometers during 1875. Neuchatel, 1876.

—— Account of the organization and working of the Polytechnic School at Zurich. Zurich, 1875.

—— Hydraulics. Motion of Water in Canals and Rivers. Newest formulas. Berne, 1875.

—— Report on the object, foundation, etc., of Voluntary School for Improvement of Merchants and Artizan Apprentices in St. Gall.

—— Bericht über die Von der Abtheilung "Bahnban" der Schweizerischen Nordostbahngesellshaft. Zur Austellung Gebrachten Gegenstände. Zurich, 1876.

SWITZERLAND—Continued.

Swiss Unions. Atlas representing the Development of Industry and of Commerce of Switzerland in the period from 1770 to 1870. By Dr. H. Warkmann, Secretary of the Directory, St. Gall. Winterthur, 1873.

GERMANY.—Catalogue International Exhibition, 1876. Official. Berlin, 1876.

Deutscher Katalog. Berlin, 1876.

SWEDEN.—Swedish Catalogues I. and II. Statistics by Dr. Elis Sidenbladh, Secretary Royal Swedish Statistical Bureau, Philadelphia Exhibition of 1876.

State of Iron Manufacture in Sweden at the beginning of 1876.

Intoxicating Liquors. Use of, in Sweden. Stockholm, 1872.

Synopsis of Christian Hammar Museum of Art and Antiquity. Stockholm, 1871.

Bessemer Steel, exhibited by Fagersta Bruk Westanfors. Fagersta, 1876.

Surahammar Iron Works. Stockholm, 1876.

Military Bridge Equipage, designed and constructed by C. Norrman, Captain Royal Swedish Fortification Corps. Philadelphia, 1876.

Description of Hydrographical and Meteorological Instruments, invented by F. L. Ekman. Stockholm, 1876.

Exhibition of the Geological Survey of Sweden. Stockholm, 1876.

SWEDEN—Continued.

Results of an experimental inquiry into the mechanical properties of steel of the Westanfors and Fagersta Works, Sweden. By David Kirkaldy. London, 1876.

BRAZIL.—Catalogue of the Brazilian Section, Philadelphia Exhibition, 1876.

Empire of Brazil at the Universal Exhibition of 1876. German, French and English editions. Rio de Janeiro, 1876.

Exposicão dos trabalhos historicos, geographicos e hydrographicos que serviram de baso a carta geral do Imperio exhibida na Exposicão nacional de 1875. Pelo conselheiro Barão da Ponte Ribeiro. Rio de Janeiro, 1876.

Estudos sobre a quarta Exposicão nacional de 1875. By José de Saldanha da Gama. Rio de Janeiro, 1876.

O Matê do Paraná (Tea Plant). Rio de Janeiro.

Same title. By A. J. de Macedo Soares. Rio de Janeiro, 1875.

Descripcão Topographica do Mappa do Provincia de Santa Catherina. Rio de Janeiro, 1875.

Chemins de Fer (Railroads) of the Province of St. Paul, Brazil. By order of Government. Rio de Janeiro, 1875.

Subsidios para ā organizacão da Carta Physica do Brazil. By Homen de Mello (Portuguese and English). Rio de Janeiro, 1875.

Agricultural Instructions for those who may emigrate to Brazil. By Dr. Nicolau Joaquim Moreira, 1875.

BRAZIL—Continued.

Topographical Map of Province of St. Paul, Brazil.

Map of the Empire of Brazil.

Physical Map of the Empire of Brazil.

Textile Plants (of Brazil). By José de Saldanha da Gama, Ph. D. New York, 1876.

Brazilian Coffee. By Nicolau J. Moreira, M. D. New York, 1876.

Theory of Negative Quantities. By Benjamin Constant Botelho de Megalhaes. Petropolis, 1868.

Historical Notes concerning the Vegetable Fibres of Brazil. By Nicolau J. Moreira, M. D. New York, 1876.

RUSSIA.—Catalogue of the Russian Section, International Exhibition of 1876. St. Petersburg, 1876.

A Glance at the Present State of Domestic Industry in Russia. By W. Weschanskoff. St. Petersburg, 1873.

Beds of Fossil Phosphates of Lime in Russia. By Al. S. Yermolow. St. Petersburg, 1873.

Forests and their Products, in Russia. By P. W. Werekha. St. Petersburg, 1873.

Fisheries and Seal Hunting on the White Sea and Frozen Ocean. By Alex. Schultz. St. Petersburg, 1873.

Statistical View of Agriculture and Tree Culture, and the Fisheries of Russia. By J. Wilson. St. Petersburg, 1876.

ITALY.—Catalogo degli Expositori Italiani. Publicato per cura del Comitato Centrale. Firenze, 1876.

HAWAII.—Hawaiian Almanack and Annual for 1876. By Thomas G. Thrum. Honolulu, 1875.
Hawaiian Guide Book. By Henry M. Whitney. Honolulu, 1875.
JAPAN.—Official Catalogue, with descriptive notes on Industry and Agriculture of Japan. Published by the Commission (Japanese). Philadelphia, 1876.
MEXICO.—Special Catalogue of the Mexican Section, 1876.
Catálogo de la Colleccion de productos naturales indigenas, etc. Mexico, 1876.
Rocks known as Mexican Onyx. By Mariano Barcena. Philadelphia, 1876.
History of the Mexican Railway. By Gustavo Baz and E. L. Gallo. Mexico, 1876.
INDIANA.—Agricultural Report, 1875.
Report Superintendent Public Instruction, 1874.
Geological Survey of State, 1876.
Report of Trustees Institution for the Blind, 1866.
KENTUCKY.—General Account of the Commonwealth, 1876.
Business of Louisville, 1876.
MICHIGAN.—Sketches of its History, Position, Resources and Industries, 1876.
History and Photographic Views of the Vienna Exposition.

In the printed report which the Commission at the request of His Excellency the Governor submitted to him and the honorable council, on the

1st of January, 1876, it was stated that "in the Resolve of the Legislature under which this Commission was formed, no provision was made for State reports upon the Exposition. The United States will doubtless publish very full reports; but in our opinion these will not take the place of special articles by our own citizens, written solely with reference to our own needs. A limited number of such articles on important topics, by able specialists, liberally circulated among our manufacturers, would repay the cost many times, and should very properly be added to the reports of our State institutions already ordered for the Exposition"; and in subsequent interviews with His Excellency the Governor, this was urged as an extremely desirable work for the State Commission. It was, however, thought by him that the full report promised by the United States Commission would render such a duty quite superfluous for a state commission, and it was therefore abandoned. During the Exhibition my conviction of the importance of this was so strong, that I endeavored, on consultation with specialists and men of science, to have it accomplished, but found that the expense would be greater than I felt authorized to incur without the cordial approbation of the Governor and Council. This work, which might have been undertaken by the Commission itself, had it remained as at first organized, was rendered impracticable by the dismissal of Messrs. Hill and Meigs, previous to the opening of the Exhibition. These gentlemen had both been commissioners to the Vienna Exposition, the one from Massachusetts, the other from the United States. They were thoroughly conversant with all the requirements of the State and of individual exhibitors, and Massachusetts owes much of its success at the Exhibition to the zeal, intelligence and devotion of these gentlemen during the six months they held their commissions. Mr. Hill's knowledge of machinery and Captain Meigs' skill as an inventor, with the experience they had derived from the previous International Exposition, rendered them most efficient assistants.

It was my most cherished desire that the State should erect a building of tasteful and appropriate design, which should be a credit to the State, and in which should be displayed all its public exhibits in the departments of education and science, including its institutions, its agriculture, and marine, together with its fishing interests. This would have proved, without doubt, the noblest state exhibit on the grounds, and would have reflected the highest credit on the State. The scheme received the greatest commendation from many of our citizens, as well as from the officers of the Exhibition, but failed, unfortunately, to enlist the sympathy and support of His Excellency the Governor. We could have there given the most complete exhibit of our school system, and instead of being cramped for space in every department, and forced to accept the hot and suffocating rooms in a remote gallery, itself divided in its central part by space assigned to a huge organ (which, however wonderful its power, did not conduce to the comfort, nor at times to the ease of hearing and answering the questions of those eager inquirers who were investigating our education system and public institutions), we would have had ample room for all, and would have rendered it a source of honest pride to the State.

Owing to instructions received from the Governor and Council in November and December, 1875,* that the Director General had been informed that Massachusetts recognized only the State Commission as having authority "to represent the State Government in this and other matters connected with the Centennial Exhibition" (referring to the assignment of land for a Massachusetts house), and that the State "could not be responsible for a building not in charge of its own agents, and that it ought not, in the persons of its Commissioners officially to assume an attitude of obligation to any committee of its citizens not acting under its authority, nor of a guest in an establishment which bears its name and purports to be its headquarters, and for whose reputation it is answerable, but over whose management the State can exercise no control," I felt that it was not within my discretion to accept an office for the State Commission in the "Massachusetts house." The necessity of deciding this point was, however, saved by the fact that no invitation to do this was ever extended to me. A large room was assigned me by the Director General, in the north-east tower of the Main Building, which was airy and agreeable, but out of the way and difficult of access. This was not so much a question of personal inconvenience as it was a matter affecting my ability to assist the exhibitors, all of whom had difficulty in finding this remote and elevated office.

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* Hon. William Gaston was then Governor of the Commonwealth.

I cannot conclude this brief Report without expressing my gratitude to the officers of the Exhibition, and my admiration for their ability and perfect devotion to the grand enterprise from the beginning to the end. To the Hon. John Welsh are my thanks especially due for his repeated acts of kind attention, and for the ready advice and assistance which he at all times was ready to extend to myself, in common with all others who represented any sphere of duty connected with the Exhibition.

LEVERETT SALTONSTALL,
Commissioner.

BOSTON, March 1, 1877.

APPENDIX.

The following very interesting and instructive papers on subjects of special interest to the people of Massachusetts, have been prepared, at the request of the Commissioner, by gentlemen, who will at once be recognized as peculiarly qualified to write upon their respective subjects; and it is to be regretted that other gentlemen, specialists in their several departments, have not been able to comply with similar invitations extended to them.

AGRICULTURE.

By E. Lewis Sturtevant, M. D.

As one entered the Agricultural Building at the Centennial, the first impression was of the immensity of the exhibit, wherein the products of different zones were gathered, and the means whereby these were produced were illustrated. It required some time to satisfy the curiosity and come down to a judicial temperament. Perhaps the best way to self-examine into one's own knowledge, is to ask one's self a question requiring a definite answer, and then the sufficiency or insufficiency of one's knowledge stands prominently before him. We will pursue this plan with the centennial exhibit, and fairly judge it from a practical stand-point by asking of it a question which should be of importance in its answering. This question shall be, "What can Massachusetts learn from this great show?" We pass from group to group, examine carefully here and there, and, failing to find an answer ready made and thrust before us, we conclude to search for it. We hence form a comprehensive summary of the contents of the building, differing somewhat, it is probable, from the official arrangement, yet having this in its favor: that it is an actual impression, and not a theoretical grouping. Our summary finds expression like this: state exhibit; individual exhibit; advertising exhibit; arrangement,—to illustrate agriculture in details, and not in its connection with human art.

From the state exhibits, Massachusetts has but little to learn; for her people already know the leading productions of the different sections, and a short study of the exhibitions at the hall shows that more depended on the energy and skill of the collector and arranger than upon the quality of the soil, or the geniality of the climate. We have no glimpse, so far as we as one of the visiting public could perceive, as to the methods of their agriculture, nor of the profits which were derived. There is nothing upon exhibition which would bring into prominence either the favoring circumstances of the farm life, or those other agencies which are to be dreaded. Neither the cost of raising the crops, nor the average crop production, nor the quality which could be raised by the average farmer, nor the prices which are received, were shown. The grasshopper never would have been dreamed of as a burden, nor would the necessity of a Grangers' movement be suspected, from the inspection. Indeed, we must harshly say these exhibits were of the nature of a curiosity museum, to amuse, to deceive, but never a suspicion of instruction for its own sake. The Massachusetts exhibit, which traced the connection between the people and their agriculture, and which offered average rather than selected results, and which subordinated selected results to average results, was the only notable exception. Massachusetts had nothing to learn from the state showings, except that she is in nowise inferior in her selected products.

The individual exhibits, apart from their advertising purposes, must also receive condemnation when we put them to the test of our question. We find the same lack of purpose, as judged from the stand-point of instruction, that we have already remarked. The leading idea was to satisfy the eye. Success was recognized in the attractions offered, and measured by the crowd that was accumulated. There were a few notable exceptions, but space does not admit of our specifying. We could find here nothing whatsoever of importance which we could bring home for practical use on the farm. What Massachusetts did learn, however, was as before, that her people were in nowise behind her sister States in enterprise, in the arts of the showman, nor in the inappreciation of what a truly national exhibit should be, as measured by the individual exhibits, and not by totals.

The advertising exhibits were the most instructive of all. In the show and exhibition of implements and processes, the persuasive efforts of the exhibitor took the place of arrangement, and supplemented the tool and the material with the uses. Here the Massachusetts student had much to learn, and here some very definite replies to our question were returned. What could Massachusetts learn from these exhibits? Primarily, that whatever may be the comparative rank of our State in production, and whatever are the facilities of our farmers for markets, for education, and the comforts which attend a peaceful and laborious life, yet she is far behind the Western farmer in the use, and the skilled use, of improved labor-saving implements. Here—in the working of his crops—the Westerner excels; and before Massachusetts can fully develop the resources given her by her climate, her geographical position, and industrial surroundings, she must take lessons from the more enterprising, wide-awake and progressive citizens of the newer States. We note among these exhibits an invention such as was at one time peculiar to New England, but is now transferred, judging from exhibits alone, to a more congenial locality; an enterprise which, formerly ours, now seems to have been transferred to where it was more fully appreciated; a 'skill which, with us, seems to have left the working of the soil for the more seductive occupation of the factory and the shop.

The second lesson to be learned, and another answer to our question, is, that diversified products, in a populous and diversified-in-interest community, are profitable to the farmer and profitable to the State; that every new market opened for farm products is a direct gain, and a gain not to be measured by its direct issues only, but by its collateral and indirect effects. Hence, as Massachusetts is a populous and a manufacturing State,—*i. e.*, a consuming population,—a greater success to our agriculture can come from an appreciation of this line of thought and an action thereon. We note the value of a fancy brand of pork to the producer; of potted meats; dried fruits and vegetables; of the various preparations from our gardens; of tobacco; of products marketed in attractive forms, etc. The Massachusetts farmer, as an individual, could have found, as doubtless many did, an answer from these exhibits, and from information obtained from the showmen, of how to make the farm pay a larger profit than was its wont. The Massachusetts farmer should learn to appreciate the importance of a quick market for produce, and the relations of product to his market, and should plainly realize that of all the agricultural markets of the States, his own, if properly worked, is the best.

As supplementary to our division, for our space is nearly consumed, we may refer to the foreign exhibits. These are neither better nor worse in plan than home exhibits; and while affording much of interest to inspect, and being pleasing from their novelty, yet offer little that is instructive to us on account of the widely different circumstances which surrounded their production, than those which we have to meet. They were agreeable as shows, but failed in the conveying of any idea of the actual condition of the agriculture in the localities from whence they came.

This brief view of the centennial agriculture, from the point which we desire to consider it, is too general in its nature to be of much special value, and, as it cannot note individual exceptions, is liable to be misunderstood. Yet we must remind, that agriculture, however important as the foundation of social life, and as the superstructure of civilization, has never received that treatment from society or from government which has been vouchsafed to its sister, commerce, and has been considered always from the superficial aspect of details, rather than from the philosophical aspect of generals. This infantile view is illustrated by the care and oversight which governments exercise to persuade, to educate and to instruct, as contrasted with the same governments' treatment of commerce. In the one case, the farmer is treated as a child, or as a half-grown youth ; in the other, as the grown man. In the one case, a toy ; in the other, a business. In the Government Building, compare the exhibit of the agricultural department with that of the other departments of our government. A curiosity-shop on the one hand, an illustration of uses on the other. The Massachusetts mechanic found much to learn from the exhibits in furtherance of his art ; the Massachusetts farmer finds little, and this little but incidental, rather than as part of a plan. The whole agricultural exhibit bears out this view, when thought of as a whole.

It seems necessary, after these remarks, to speak of the remedy,—the need of the farmer. This need is education ; from the lack of which these results are as they are. The farmer—the Massachusetts farmer—who visited the exhibition, had much to learn ; and this he learned, not from his special department, but from a general survey of the products which marked the triumph of man over nature ; of education over ignorance ; of skill and art over matter. Our exhibition was a success even in the showing up of our deficiencies, as in bringing into prominence the fulness of our achievements. Let us hope at our next international, the farmer will make a showing worthy of a better comparison, wherein the maximum of products shall occupy less prominence than the uses and the methods.

COTTON TEXTILES.

By Edward Atkinson.

Among the objects exhibited in Philadelphia, none attracted more attention than the American cotton fabrics, and among these the fabrics of Massachusetts took a leading position, although it might not perhaps be said that the exhibition from one State was better than another, where all were so good. The finest yarn ever spun in the United States, No. 400, was exhibited by the Willimantic Thread Company of Connecticut; the finest fabric ever woven here, a satteen jean, No. 100 warp and No. 150 filling, 96 by 350 threads to the inch, was exhibited by the Berkeley Mill of Rhode Island; but in solid, substantial, and useful fabrics, either for home consumption or export, none could claim superiority over those of our own State, while Fall River asserted her preëminence in quantity and averago quality of her specialty,—printing cloths. But it is not the purpose of this report to make individual distinctions among the exhibitors; rather to reach general conclusions, and to state the general lessons taught to us.

It is to be regretted that there was not a better opportunity for a comparison with the cotton manufactures of other countries. Unfortunately, the exhibit of cotton goods from France was confined to the finest lawns and organdié muslins, with which we do not yet compete to any great extent; her excellent and substantial medium cotton fabrics were not represented at all.

Great Britain exhibited only a few specimens of fine and pure bleached goods and some printed cottons of excellent quality; but the great variety of fabrics, such as she makes for general export, were not represented.

Canada exhibited heavy goods of excellent quality. Belgium showed a line of goods intended for export, and which indicated the kind of competition which we shall meet in some foreign countries. Dutch and Swedish goods were as solid and well made as might have been expected, and no goods excited more surprise for excellence in manufacture and in printing and coloring than the cotton fabrics of Spain and Russia.

Although there was no sufficient exhibit of cotton fabrics from abroad to make a fair comparison possible with our own, yet it early became evident from the conclusions of the foreign visitors, that no country on the whole excels or even equals our own in the production of thoroughly well made, substantial and useful goods at low cost, and it is no longer a question that the proximity of our factories to the great cotton field of the world will assure to us a constantly increasing share in the supply of cotton fabrics.

We are gaining rapidly, although as yet our export is but three per cent. of that of Great Britain. Our largest export before the war amounted to a little less than $11,000,000 in value in the fiscal year 1859–60. In the fiscal year of 1873–4, our exports amounted to less than $5,000,000, but in the calendar year, 1876, we reached the largest sum yet attained.

The official figures of the Bureau of Statistics give the sum of the export of cotton goods at about $9,000,000, but the statement is very imperfect as it relates to Canada.

It appears that the customs authorities of Canada credit us with about $2,000,000 more in value than we charge them, and they are doubtless correct, as they collect the duties upon them. Making this correction brings our total export to a little over $11,000,000 value, which sum probably represents 10 to 15 per cent. more goods than were exported in 1859–60, as the prices are now lower. This export is even now a balance-wheel in this branch of our industry, and as it has increased it has given steadiness to the whole trade of which it forms but a small part; yet it is insignificant in comparison to the export of cotton goods from Great Britain, which amounts to over $360,000,000 in gold value annually.

We enter into friendly strife with Great Britain under some advantages. We are nearer the cotton field, and in respect to supplies of leather, lumber, iron, steel, fuel, starch, and oil we are equal, to say the least, while in respect to local and national taxation we are at a grave disadvantage. This competition becomes a curious problem when reduced to its least terms, or when compared in terms of least and greatest. The statement which appeals to the imagination is the latter; it may be made in the following terms.

The spindles of the civilized world number over 68,000,000, of which a little more than 14 per cent. are in the United States, and a little less than 6 per cent. in Massachusetts. In the operation of these spindles, about 1,000,000 working men, women, and children convert over 6,000,000 bales of cotton each year into 10,000,000,000 yards of cotton cloth, 36 inches wide, of the average weight of the fabric produced; or into the equivalent of such cloth in other fabrics; thus furnishing an average of 20 yards in each year to 500,000,000 people. About one-fifth part of the whole quantity of cotton used is, however, consumed in the United States, where the consumption is much greater proportionately than in any other nation. The remainder would supply only 400,000,000 persons with an average of 20 yards each.

A further analysis of the exports of Europe and the United States combined, proves that the combined exports of the two nations to Asia, Africa, South America, Mexico, and other states which have little or no cotton-machinery, would suffice to supply only 160,000,000 people with five pounds, or twenty yards of cloth each per year; and when it is considered that these continents or states contain 800,000,000 to 1,000,000,000 of people mainly clothed in cotton, the future extension of our commerce becomes apparent. In respect to China, by itself, the total export of Great Britain and America would suffice for only six or seven per cent. of the population at twenty yards each.

When it is considered that cotton fabrics constitute the cheapest and best material for the clothing of mankind on the larger part of the world's surface, this mode of stating the problem makes it very apparent that much more remains to be done; and while self-interest only causes us to ask the question, By whom and where shall the new work be done? there is yet a higher view to be taken, and we may well remember that in commerce, whether between men or among nations, each serves the other, each gains in comfort and well-being, each gains time for leisure and improvement or for other work by the exchange of services of which all trade consists.

But now let us consider the problem stated in its least terms. Cotton fabrics are gauged by the number of the yarn of which they are made, and the number means the number of skeins of 840 yards each contained in one pound avoirdupois.

We may omit all consideration of numbers of yarn coarser than No. 13 or finer than No. 40, as the greater part of the cotton manufacture of Europe and America lies within these limits. A yard of No. 13 weighs $\frac{641}{1000}$ths of a grain; of No. 40, $\frac{208}{1000}$ths of a grain. The question of supremacy in the variety and cost of fabrics between Europe and America, therefore, lies within the limit of less than half a grain on the yard of yarn that must first be spun and then woven. As to the cost, the competition is chiefly confined to plain or twilled fabric and printed goods. In the cost of manufacture, the competition on coarse goods is within the limit of half a cent a yard, and on fine goods within a cent or a cent and a quarter a yard; in printing common calicoes, within the limit of half a cent a yard.

These small fractions represent the maximum difference in the cost of labor and supplies in a well or ill managed mill, or between this country and Great Britain. It is not intended to admit that there is even so great or any difference between England and America, only that these figures represent the greatest difference ever alleged. On the other hand, a part or the whole, even, of this difference in cost of labor and supplies as it may exist, would be offset by our proximity to the cotton fields.

A marked feature in this branch of industry is in the few persons employed. In the United States the whole number of operatives in all the cotton factories and print-works does not exceed 150,000 or 160,000. Herein is the progress that marks a century, that the slow and arduous labor of almost every woman was at the beginning needed to be applied to the single spindle, now only seen upon the spinning-wheel that forms one of the curious ornaments of the parlors of those who are fond of old relics, in order to give scanty material for the hand-loom, as slowly operated by some other member of the family or by a neighbor; now, one woman clothes a thousand others, and in many ways lives more fitly and comfortably herself.

It would be hardly fit to complete this statement in regard to the cotton manufacture, without giving a word to cotton-machinery and to the production of cotton. The exhibit of cotton-machinery was not large, either in contributions from Europe or America; but, while Massachusetts had no complete exhibit of all machines, she led the other States in the proportion of new devices.

In regard to the exhibit of raw cotton, the exhibition was marked by a collection of commercial bales of every variety of cotton customarily sold in Europe, collected by Messrs. Claghorn, Herring & Company of Philadelphia, and said to have been the best collection ever made.

It has been sold to the Dutch authorities, and is to constitute a part of an international exhibition of the products of the soil about to be opened in Amsterdam.

The exhibit of American cotton was limited in quantity, but was of the finest quality. Every bale was of the highest grade, but, as it appeared to be the desire of the contributors that the selection should be a very rigid one, it was made by rejecting one bale after another until there remained but three, among which the judges could make no discrimination, and for which they made three awards. When the key was opened that disclosed the name and status of the contributors, it was to the equal satisfaction of all the judges, whether from the North or South or from abroad, that one of the diplomas had been gained by a freedman, one whose farm, formerly known as the Joe Davis plantation in Mississippi, now proves that the production of cotton no longer depends on slavery for its abundance or its quality, while another was gained by a Vermont farmer who moved to Louisiana since the war ended. The crops of cotton of the last eight years exceed the last eight crops raised by slave labor before the war, in the number of more than 1,500,000 bales, and it seems assured that we shall soon provide even more than the 75 per cent. of the demand of the civilized world which now constitutes our proportion.

May it not, therefore, be certain that, underlying the political turmoil and tribulation of the hour, industrial forces are at work, both in the South and in the North, that will in the end assure peace, good-will, and plenty throughout this broad land to every one who seeks these blessings in truth and soberness?

THE WOOLS OF COMMERCE.

By George W. Bond.

To Hon. Leverett Saltonstall, *Commissioner, etc.:*

In compliance with your request that I would furnish for your report the description of my exhibit of wools presented to the judges, with some further remarks upon the wools exhibited at the Centennial Exposition, I submit the following:—

This exhibit was prepared on short notice at the request of the Massachusetts Commission, to represent the wool trade of Boston.

The object sought was to represent, as fully as possible, the wools quotable for the market. To present them in an intelligible form, they are placed in glass cylinders in the condition in which they are usually sold, with a few scoured locks on blue cards, to show the average character of each.

No attempt was made to show the wools of the several old wool-growing States, as it was supposed that each of these would make a better display of its own products than could be obtained in market.

A large number of specimens from the new trans-Mississippi States are given, in order to show the progress of wool-growing in that section, and the gradual change from the old Spanish Churro to the Merino race.

It is hoped that, while showing the wools of commerce, this exhibit may lead our agricultural colleges to the formation of cabinets of wool, to aid such study of the adaptability of races to the great variety of climate and soil which this country presents, as will enable our farmers to select or create a race for each and every locality.

The expectation of the full display of the wools of the several States, referred to in the above description, was not realized, though some of them, at a later period of the Exposition, did present specimens, chiefly in locks, which gave some idea of their various wools, but none that I can recall in so full a manner as so important a product of our country demanded. This is very much to be regretted, as, while in the statistics of the wool product of the world the United States shows, in the number of pounds produced, no mean position, the character of her wools is but little known outside of her own borders.

Dr. L. Fitzinger of the Imperial Academy of Sciences, Vienna, in a series of elaborate articles in the reports* of that institution in 1859 and 1860, which form an exhaustive treatise upon the sheep of the Old World, winds up with the following:—

> "North America has obtained its sheep chiefly through England, but also a part through France, and most of the races which are found in England and France are also found or met with in the United States. In many States, the introduction of the high-bred Spanish races has been attempted, but to this day (1860) it appears to be only in the provinces of Virginia and Kentucky that this culture has been prosecuted with success."

Now, while Doctor Fitzinger was wonderfully accurate in his report upon the sheep of the Old World, this shows the most utter ignorance of the progress of sheep-growing in this country, where Merino sheep were introduced but little later than in the leading countries of Europe, and where, for nearly three-quarters of a century, they had been raised with as complete success as there, and have formed sub-races as distinct and valuable as many of those which he gives a fixed position to in European countries.

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* Uber die Racen des Zahmen Schafes. Sitzungs-berichte der Kaiserlichen Akadamie der Wissenchaften.

It was admitted by the commissioners from Australasia that the American merino is the best stock with which to renew and keep up the character of the Australian sheep, as it forms a larger and healthier animal, and one yielding a larger amount of wool. It is to be hoped, therefore, that at the World's Exposition in Paris, next year, there will be a full display of American wool, not in locks only, but in fleeces, from every State and Territory, for each State has its peculiar character.

In the absence of state displays, this was well shown in an exhibit made after the examination and awards of the judges, by Messrs. Fiss, Banes & Erben of Philadelphia. Fortunately, this was placed next to that made by myself, and admirably supplemented it by supplying the deficiency of American wools. Thus, the two together, gave as complete an idea of the wools of commerce as could be given in the short time allowed to each of us for preparation.

The native sheep of the States and Territories which were added to this country from Mexico, and, indeed, of all Spanish-American countries, have been supposed by many to be degenerated animals of the Merino race, but a careful comparison of the specimens of such in my cabinet with the specimen there of the Churro wool of Spain, and of the Churro wool exhibited at the centennial by Spain, with the native wools exhibited from the various provinces of the Argentine Republic, will convince any one who studies the subject that they were from that race, and not from the Merino. The native wool exhibited by Chili, however, as well as the specimens of the same in my cabinet, show a different character, which can only be accounted for on the supposition that, at the same early date, after the introduction of sheep from Peru of the Churro race, others, of coarser race, were introduced by sea and crossed with them, of which we have no record. It may have been by the Dutch, who, for a short time, got a foothold in that country in the early part of the seventeenth century, and who always carried coarse Guinea sheep wherever they settled.

The Argentine Republic made quite a full display of the wools of the several provinces, and, among others, some skins from Catamarca, with wool of remarkable length, said by the accomplished commissioner of that country, Dr. E. Oldendorff, to be a native race of that province. They show, however, such a marked difference in the wool from that of all the native or Criolla races of the other provinces, it seems probable that some sheep must have been introduced there from Peru or Bolivia, which countries, or, certainly, Peru, had the Merino before any other country of South America. The wool, certainly, bears more resemblance to some that has been imported from these countries than to that of any other known race.

In addition to the desire of showing the wools of commerce, as stated to the judges, one great, and perhaps the greatest, inducement to prepare the cabinet, was the hope that, being shown in the agricultural department, those whose duty it is to educate our farmers might, by seeing such a collection, feel it important that in each of our agricultural colleges there should be the fullest cabinets of wools attainable. With such cabinets before the students, there could hardly fail to be some who would be attracted by them to study the influences that have produced such varieties, and thus be led to observe the facts that climate and soil produce so subtle an influence upon wool, that precisely the same characteristics cannot be found in sheep grown in different localities, even though but slightly removed from one another.

As no sheep thrives so well, or yields so great a profit when raised in large flocks, as the Merino, they are especially adapted to a new country where the grazing is almost unlimited. It has become almost impossible, even with our high tariff, for the farmers in the old States to compete with those in the extreme West in the growth of Merino wool. At the same time, the value of the sheep upon the farm was never more realized than now, and the growth of sheep, for mutton chiefly, and wool incidentally, never promised more profitable returns; for, in addition to the increased demand for food in our own cities, we have now found that we can profitably ship fresh meats to Europe, and have every prospect of a large and increasing demand from there.

It is, therefore, of the utmost importance that our farmers should understand how to introduce, or, better, how to produce, such races as shall be especially adapted to their several localities.

One of the cabinets was surmounted by a sheep of the Otter, or Ancon race, descended from a short and crooked-legged ram, born in Dover, in this State, in 1791, which has been able to perpetuate its hideous deformity through an unknown number of generations for eighty-five years, thus showing how, in breeding, even deformities may be perpetuated. On the other was placed a Merino ram, which, if it had been properly mounted, would have proved equally well how all defects may be eliminated.

It was hoped that this strong contrast would have encouraged some to feel that it was in their power to create just such a sheep as they might need. This Otter, or Ancon sheep, the only race recognized by Darwin, Huxley, and other scientists as of American origin, is now nearly extinct. Deformed as it is, in its day it served the purpose of the man who originated it; viz., a race which could be kept within the walls or fences then in use, and it became a great favorite with many of the farmers of that day, who were much annoyed by the difficulty of keeping their sheep in the pastures. It was supplanted by the Merino, a quiet race, with which no such difficulty was found.

This farmer acted wisely, as he bred to meet his need. Will not his success, and yet more, that of our sheep-growers of Vermont, who have created an almost perfect Merino, encourage others to endeavor to meet the changed demand of the present day?

As a whole, the exhibition of wools at Philadelphia was not so full as we hoped it would be. Perhaps no country was more deficient than our own. It was only by the strenuous efforts of the Commissioner of Agriculture, Mr. Landreth, that anything of importance was done in that direction, with the exception of Oregon, which young State showed some wonderful specimens.

The various countries of Australasia made very full and fine exhibits of their leading staple.

The Argentine Republic showed almost every variety of wool grown within its limits, among them some called Lana de Lina, or wool of the cross of the he-goat upon the ewe, from two provinces. This cross has often been spoken and written about, but rarely seen here. It makes a sterile animal, and though the fleece greatly resembles that of the sheep of the same provinces, it has little value, being very wiry and very slippery. The skins are valued by the natives, who cover their saddles with them, frequently putting eight or nine over the saddle and mounting on top of them. They serve the purpose of bed and covering by night when they cross the mountains.

The finest display made was from the Tatay Estancia, owned by Samuel B. Hale, Esq., now a prominent merchant of Buenos Ayres and formerly of this city.

Germany and Austria presented some beautiful specimens of their world-renowned fine wools.

Russia, which has the largest number of sheep of any country, yielding wool of every grade, from the very coarsest and almost worthless Kalmuck to very choice Merino, was well represented, and exhibited specimens of the latter which showed a body and length of staple unsurpassed anywhere.

Spain, to whom the world owes the Merino, displayed not only specimens of that race, but of other races which undoubtedly existed there before the Merino, the most curious and valuable of all known races, was created.

The Cape of Good Hope had some good wools, but not a fair exhibit of the most beautiful wools she gives us.

Canada made a fine show of her combing wools.

Chili, Peru, Brazil, Turkey, and Egypt each gave some idea of their contributions to the world's supply.

John L. Bowes & Brother, of London and Liverpool, contributed a fine collection of the wools of commerce and their substitutes, which they have generously presented to the Smithsonian Institute, and at a late day Mr. John Mitchell of Bradford, England, sent a fine series of the combing wools of Great Britain, a character of wool which is yearly coming more into demand in this country and, indeed, in the whole civilized world.

WOOLLEN TEXTILES, — CLOTHS, FLANNELS, AND HOSIERY.

By Richard S. Fay.

In the great industry of woollen manufacturing, the New England States lead our other territorial divisions in the importance of their establishments, and the amount and value of their products, and Massachusetts stands at the head of all the States, approached only by Pennsylvania. It was, therefore, with peculiar interest, that we entered upon our examination of the display of woollen goods of our own and other countries at Philadelphia, and with great pride and satisfaction that we noted the variety and excellence of our fibrics. None of our staple manufactures was more fully or better represented, and on the arrangement and exhibition of none were taste and care more lavishly bestowed. Among the many wonders that grew from the completeness and admirable management of an exhibition organized and principally occupied by a nation without previous experience in shows upon so vast a scale, no visitor could fail to be struck by the beauty and artistic elegance of the cases, and the arrangement of the products contributed by the woollen manufacturers. Nor upon more careful examination did the contents disappoint the first agreeable impression. Ranging from heavy Western blankets to light dress goods and delicate flannels, there was scarcely a known woollen fabric of which the United States did not show creditable, and in many instances unsurpassed specimens, and our own State stood in the foremost rank both for range and perfection of manufacture. While admiring and commending the public spirit and generous rivalry of the American exhibitors in showing their fabrics enclosed in costly and elaborate cases, we could not help doubting whether the objects of the exhibition—instruction and comparison—would not have been better obtained by leaving the goods, like most of the foreign cloths, open to examination by touch. To the practised buyer or manufacturer the hand is scarcely second to the eye in judging of the quality of woollens, and while the goods might have been somewhat disturbed by handling, and, perhaps, in some instances have required to be renewed or refolded, the comparison with foreign cloths could not be complete without trying the *feel* of both.

First in number and importance stood the various grades of flannels—the first manufacture of woollens to be perfected in this country, and to which the wool of our common breeds of sheep is best adapted. In this field we have no superiors, the quality and durability of our goods leaving nothing to be desired, and the economy of production having attained a point which makes us entirely safe from foreign competition. Delicate coloring and perfection of manufacturing were admirably illustrated by Gilbert's opera flannels, one of the most attractive exhibits in the main building, but the principal display was of the medium grades of staple goods in common daily use, of which sixty to seventy million yards are yearly produced in this country, and whose honest make and serviceable character bore their own recommendation to the consumer. The vast new field open to sheep-raisers in California has developed an enormous increase in the production of wool suitable to the manufacture of flannels, and no country now possesses to a greater degree than our own, the advantages of a cheap and plentiful raw material for goods of this class. Labor does not enter so largely into the cost of flannels as to offset in competition with foreign countries our abundant water power and nearness to our staple and our consumers, and there is no danger but that our flannel manufactures can keep the control of our own markets. The same may be said of the kindred fabric of blankets. We have long produced the medium and lower grades cheaply and well, but it has been reserved for our Western and Californian manufacturers to surpass all others in the weight, fineness, and beauty of both bed and travelling blankets. Some very beautiful fancy woven blankets were exhibited in the Spanish and Mexican departments, but no staple goods equal to our own best qualities.

Of all woollen fabrics, none were so universally exhibited as fancy cassimeres, a term embracing all fancy woven and colored goods for men's wear, and of which every manufacturing district represented at the exhibition sent specimens. The variety of weights, designs, and colors was infinite, and the perfection of manufacture attained by several countries very high, so high that comparison was difficult and invidious in view of the excellence of each. It was noticeable how largely the styles of the continental manufacturers were inspired by French designs, and that even the English had borrowed the ideas of their Parisian neighbors for their finer cloths. In the rougher and more peculiarly British textures however, the old standard plaids and heather mixtures still prevailed, admirably suited to the strong, elastic character of the Scotch and North of England wools. The manufacture of fancy cassimeres in this country comes only second in quantity to that of flannels and is probably superior in value, and in no branch have our manufacturers made so great progress in the past twenty years. The improvement in our breeds of sheep has furnished a staple perfectly adapted to an article requiring strength and durability rather than high finish; and the practical and serviceable character of this class of goods has made it universal wear in every-day life. Ranging in price from $1 to $5 per six-quarter yard, fancy cassimeres are produced in every conceivable variety of fineness and design, and of course with very various degrees of skill. The best grades manufactured in this country compare favorably in design and quality with the finest foreign goods exhibited, and probably are in no respect inferior to them. In fancy cassimeres we have some foreign competition in our own markets, confined, however, to goods to which our domestic wool is not adapted and to the very finest class of French cassimeres. Another ten years of such progress as we have made in the past and we may bid defiance to the foreign manufacturer, except perhaps, for the small quantity of Scotch goods imported. Our Canadian cousins exhibited many excellent fancy cassimeres of medium grade and some very good imitations of the Scotch goods referred to above. The Mexican manufacturers also, sent some creditable samples of their industry, but the number and variety were very limited.

In fine-lustre goods, including broadcloths, doeskins, and high-priced beavers, we were at once brought in face of a very formidable competition, meeting the specially skilled industry educated for hundreds of years in the older countries. French and Belgian doeskins and cassimeres, Yorkshire beavers, and West of England cloths challenged comparison by our own display, limited in this class of goods as compared with our exhibits of flannels and fancy cassimeres. Our present breeds of sheep do not furnish the wool best adapted to the manufacture of highly-finished cloths, and it is doubtful if our soil and climate are adapted to its growth. Fashion, too, has decreed a gradual disuse of face goods, for which fancy cassimeres and dry-finished cloths furnish a cheaper and more serviceable substitute. Under these disadvantages, we were surprised to find this class of goods so well represented by our Massachusetts manufacturers. Except in the very finest quality of broadcloths, we had fabrics comparing favorably with the best foreign goods, and showing that, with a moderate protection to the more expensive labor, which enters so largely into the cost of highly-finished cloths, we required only a demand to rival our older competitors. It is not our province in this article to select individual manufacturers for praise, but it would be incomplete without the mention of the admirable line of fine beavers exhibited by the Germania Mills at Holyoke, which fully equalled in their class the best foreign goods exhibited. In the medium and lower grades of beavers and kerseys, our line was complete and satisfactory.

In shawls and the lighter fabrics adapted to women's wear, many creditable fabrics and designs were shown, mostly of medium quality and cost. A few shawls manufactured especially for the exhibition, equalled in fineness the best Scotch and French exhibits, and there were some excellent repellent and other cloakings. We had nothing competing with the English linsey-wolseys, or the beautifully fine French dress goods, a field left in this country to the worsted manufacturers.

Midway between flannels and fancy cassimeres stands a grade of woollens for men's wear, which the hot, yet variable weather of our summers makes of great importance in the United States, and broadly classed as milled flannels or suitings. These most useful goods were largely represented at Philadelphia, and commanded special attention and commendation from foreign experts. These cloths would seem to be well adapted for export to the semi-tropical countries of South America, and it is to be hoped that a serious attempt will be made to take advantage of the favorable impression produced by them on visitors from those countries.

Four establishments only exhibited the best class of underwear, known as "full-fashioned" goods. The application of power to the knitting-frame is of recent invention, and our labor has been too dear to be used to any great extent for the slow-producing hand-frames. Hence our products have been chiefly cut goods, sewed at the seams by machines. Several States exhibited excellent examples of the latter class, tastefully trimmed and marvellously cheap, none excelling some of the work from Massachusetts. In cut goods we have distanced foreign competition, but full-fashioned underwear is largely imported, the American articles being as yet but little appreciated. It is to be hoped that our manufacturers may be encouraged to persevere in their efforts to perfect and extend their production of the higher-priced knitted fabrics until we become as completely masters in this field as in the lower grades of woollen and cotton hosiery. In fancy knitted goods we have attained great proficiency, Philadelphia taking the lead in skill and variety.

The exhibition of woollen-machinery at Philadelphia was limited, except in the department of weaving. Two Massachusetts machine-shops exhibited looms of various classes, probably superior to any invented, in the combination of compactness and high speed, with the power of working a great number of harnesses and shuttles. American weaving differs essentially from the practice of European manufacturers in the much higher speed at which our looms are run. Our fast looms have not, as a rule, found favor with the foreign weavers, and it is doubtful if the soft-twisted yarns, so much used on the continent of Europe, or the short stock of the Yorkshire manufacturers, can be woven to good advantage on our machines. But for hard-twisted yarns, made of our strong, domestic wool, our

American looms are incomparably superior in economy and efficiency, and the admirable workmanship and finish of the looms exhibited deserve the highest praise. A New York loom, with a positive shuttle-motion, attracted much attention, and may lessen the difficulty of weaving slack-twisted yarns. Our Worcester machinists have succeeded in giving the fancy loom an almost unlimited automatic capacity, forty harnesses and eight shuttles being masters of an inconceivable variety of patterns.

Owing, no doubt, to the cost and difficulty of transportation, very little foreign woollen-machinery was exhibited. We noticed a frame for continuous spinning; but as it was not in operation, could not form an opinion whether it was more likely than the many unsuccessful machines hitherto invented to accomplish the much-desired purpose. The Belgian carding-machine was of excellent and substantial workmanship, but did not differ materially in principle from our own, to which it approaches more nearly than any of the carding-machinery used in Europe. It is to be regretted that none of the Yorkshire cards, commonly used in the North of England and Scotland, were exhibited,—the large carding-surface, soft clothing, slow speed and light feed being diametrically opposed to our own machines and practice, and furnishing a very interesting ground of comparison. There can be no doubt of the efficiency of the English machines for working short and tender stock, and their adoption for this purpose might open a new field to our manufacturers.

Apart from the perfecting of the fancy loom, the only radical improvement of the century in woollen-machinery has been the invention of the automatic mule. We received this machine from England, and for a year or two were dependent upon foreign workshops for our supply. Our mechanics were not slow to adopt the invention, and have in some respects improved upon it, and we have now perfectly satisfactory American mules and automatic jack attachments. Our machine-shops are fully competent in capacity and skill to supply our mills with the best classes of woollen-machinery.

From 1860 to 1870, the number of sets of cards employed in the manufacture of woollens in the United States nearly trebled. Undoubtedly this rapid increase was fostered by the extraordinary circumstances created by the war, but the fact that very nearly all of this machinery is in operation to-day, proves the general prosperity of the business and the increasing consumption of woollen goods. That the value of woollens imported is but about ten per cent. of our domestic production, attests our emancipation from dependence on a foreign supply. Of the 8,500 sets of woollen machinery in the United States, 1,750, or more than one-fifth, are credited to Massachusetts, distributing annually nine million dollars in wages, and producing over forty million dollars' worth of goods. With an increasing and improving raw material, with labor becoming every year more skilled and less fluctuating, and with the practical monopoly of our own great market, the prosperity of woollen manufacturing in this country seems assured. Can we not, aided by the enterprise of our merchants, seek to compete with our rivals in other markets, and find an indefinite extension for our production?

ON THE EXHIBITION OF MACHINERY AT THE CENTENNIAL.

By H. A. Hill.

The Centennial Exhibition of 1876 compared favorably with its predecessors in nearly all departments; but it was in machinery that it was, beyond all doubt, preëminent. This was the universal testimony, not only of Americans who had seen the later foreign expositions, but of the commissioners from abroad, who were open in their expressions of admiration of the workmanship, and of the adaptation to the purpose, of our tools and machines.

In this department of machinery Massachusetts could not but take a good position. Her exhibits were to be found in every group, and in almost every case were creditable to the exhibitors. During the time of preparation, while the writer acted as one of the Commissioners of this State, he gave particular attention to this department, and made what effort he could to secure such a representation as should be honorable to the Commonwealth, because he believed it was particularly important to our future interests as manufacturers that we should appear well in our machinery. It was his intention, had he remained in service during the continuance of the Exposition, to make a detailed examination of Machinery Hall with reference to the comparative merits of our New England work and that of other sections, and to prepare a report setting out in detail the points of superiority and of inferiority to the productions of other locations, calling attention especially to the latter, and showing, so far as he was able, just what our machinists have to do to bring themselves fully up to the mark. As it is, having been relieved from service at the opening of the Exposition, he was unable to undertake what would have been an arduous, but as he believes, a most useful service to the interests of our manufacturers of machinery, and can now only call attention to some considerations relating to the general effect of the Centennial upon the manufacturing business of New England.

Unlike other sections of the country, we in Massachusetts have chiefly our manufactures to look to for our prosperity; and these are largely dependent upon the character of the machinery by whose means they are carried on.

Our machine-makers are therefore an object of consideration in the State, not only on their own account, and because they are directly an important interest, but also because, indirectly, all our manufactures of every kind depend in a greater or less degree upon their prosperity, their ingenuity, their invention, for their own progress. And if our machinists fall behind those of other States, and lose position, courage, and enterprise, their decadence will react on every department of manufactures. The importance of their success to the interests of the State can hardly be overstated.

New England, and especially Massachusetts, is the home of machinery in the United States. Originally, it was nearly all produced here; but of late years capital has increased in other sections, experienced men have emigrated thereto, and other centres of manufacture have been established, some of them of considerable importance, until at the present time, much of the best machinery used even in New England is produced in other parts of the country. This has been understood to some extent by our machinery manufacturers, and had already been a matter of solicitude with them; but the grand display of the Centennial for the first time developed the completeness with which control of the markets in this country has been wrested from us. Massachusetts was at best but one State among many in her display, and in some departments, it must be confessed, that machinery from other sections was of a higher character, more advanced in style and in productive power, than that from our State. Probably most of our manufacturers had not realized the extent to which this outside manufacture had advanced, and certainly it was a revelation to a large part of the general public, which, for the first time, discovered that the wants which they supposed they could fill from New England alone, could be as well, or better, supplied in other quarters.

On this account, the immediate influence of the Centennial is likely to be very unfortunate upon our interests, as it has tended very much to accelerate the course of events in destroying the traditional reputation of New England as the only source of machinery.

How far this is an unmixed evil, depends upon how completely it rouses us from our complacency, and leads us to apply ourselves to an active and intelligent removal of the causes which have produced this result, so far as it lies in our power.

Some consideration of the reasons for this late growth of the machinery interest in other sections of the United States will help us to consider what must be done to retain and increase the business in this department which remains to us.

First. The increase of capital in other parts of the country, which has led to the introduction of manufactures.

Second. The contiguity of raw material, iron, coal, and proper wood; also of the markets for various specialties. The questions of freight here weigh against us, which, however, become less important as the character of the manufacture becomes more perfect and valuable; it is powerful as the article made is cheap and coarse in character..

Third. Many of our younger and more enterprising machinists have emigrated to other regions, carrying the best of our experience, and supplementing it with a broader and more energetic grasp of business which such a change of home often produces. Breaking away from the ruts into which the various lines of manufacture tend to run in an old-established location, they design new and more modern forms of machinery, and, forced to originate, they procure and study the books, scientific papers, and machines of other countries, and thus produce better and more effective types than those left in New England. It is a fact, that in the offices of the machine-builders of the Middle States especially, one will find much larger scientific libraries, and many more scientific magazines, than in those of New England. This is a very important source of superiority.

Fourth. Many of our home manufacturers of machinery have shops largely filled with old, out-of-date machines, to whose use they have become accustomed, but which, compared even with their own later productions, are light, ineffective, and weak. Their competitors, on the other hand, in the Middle or Western States, have more lately established themselves; have bought in New England or elsewhere, much more powerful and convenient tools; have more largely adopted modern labor-saving special machines; and, were there no other advantages in their favor, can much surpass the older houses in the quantity and the quality of their manufactures through this means alone.

These considerations will suggest the course to be pursued, if our towns desire to keep and increase the manufactures of their localities, if our capitalists wish to see their interests at home productive, and our legislators desire to encourage this important part of our industry.

We cannot wholly overcome the advantages of other sections in contiguity to their markets and through the saving of freight, but by our larger experience in manufacture, and through the greater number of trained workmen, of Yankee education and ingenuity, we can largely compensate for these obstacles, if we will.

First. We must put into our shops newer and more powerful tools, in place of those which are out of date and unequal to the demands of the time in power and accuracy. "Rotation" in tools is as important in mechanics as in agriculture. Some of our best shops are already in the habit of making these exchanges, selling out their older tools, from time to time, as they find purchasers, and replacing them with new ones. The shops that have done this, are to-day the ones which are in the best position of any in the community, and are sustaining themselves to better advantage through the hard times than others. It is certain that in the future they will gather a larger and larger proportion of the business of the State to themselves.

Second. Our machinists must examine and adopt, so far as they are adapted to their business, the new special tools now introduced, such as grinding machinery and milling machines. Of the latter, prominent engineers have expressed the opinion that their general introduction into machine manufacture is destined to work a revolution therein.

Moreover, we must carry farther the principle of working in specialties, and of fitting up with special tools for such work.

But more than this,—and indeed to do this to the best advantage,—we need to introduce more science and a wider range of education into our mechanical work. The manufacture of machinery to-day requires, to meet the competition of other parts of the world, a much more scientific and exact mode of working than it did twenty years ago. It requires, also, a broader and more general business education. The influence of the community should be exerted to introduce the graduates of our technical schools into this department. Too large a proportion have hitherto gone in other directions; and yet, the mechanical department seems, when properly conducted, to offer the highest rewards of any of the technical pursuits. The names of Whitworth and Schneider, Siemens and Krupp, Sellers and Corliss, are not overshadowed by any, in the Old World or the New.

It is one of the satisfactory things in the conduct of these schools, that their managers appear to comprehend the importance of the point here pressed, and are making great efforts to develop this branch of education. Our capitalists in the manufacturing towns, our citizens generally, cannot too strongly lend their influence to introduce this educated and scientific element into our manufactures of machinery.

Another source of mechanical improvement is to be found in fairs. There can be no doubt that the large and admirably conducted fairs of Cincinnati and Chicago have been a great stimulus to the Western industries, and were of much value to them as a preparation for the Centennial. The close comparisons, the competitive tests, the general criticisms and discussion which such an exhibition provokes, are of the greatest influence in educating manufacturers. It is not too much to say, that the exhibitions of the Mechanic Association in Boston, have, in the past, had a vast influence for good in this State. At the same time, there is room for doubt if the present influence of that Charitable Association is wholly advantageous. It has assumed a sort of prescriptive right to conduct the fairs of New England. Were it not for this, it is probable that the manufacturers would be forced to organize a society of their own for this purpose, which would conduct the exhibitions on a larger and more comprehensive scale, and with less regard to immediate financial success. If this association retains its position as the manager of fairs for New England, it should be made to feel, by a strong public opinion, that it owes duties to the public as well as to its own treasury.

These are the directions, then, in which the Centennial teaches us we must look to keep our share of the manufactures of the country, to wit: The introduction of more effective tools, in place of the old, feeble, and worn-out machines of a past period; new ways of working, and a higher and broader scientific education among our machinists.

There remains one other consideration, created by the recent great fall in prices, and illustrated by the results of the Exposition: that of the foreign business. And here, we are as well situated as any other section of the country, and with proper effort can much more than compensate ourselves for any loss of domestic orders.

In England, more than one-half of the machinery manufactured finds a market outside the country. What an advantage for us, if we could add to our domestic sales an equal amount of foreign contracts. And yet, the writer ventures to assert, that if our productions were as well known as the English, and could be compared without prejudice upon their actual merits, that in very many departments they would have the preference for quality of workmanship, for convenience, for productive capacity, and even in respect to price; and he believes those most familiar with the workshops of both the Old and the New World would be the first to indorse this opinion.

The difficulty in reaching the foreign markets lies not in our want of mechanical skill nor from too high prices, but from our ignorance of the means of reaching customers abroad. The English are, above all, a nation of merchants, and their builders of machinery have established a reputation, and have their correspondents in all parts of the world. Our manufacturers, on the other hand, have mostly grown into prominence since 1860, and are utterly ignorant of the value of foreign connections and the modes of forming them. That business enterprise which knows no country, which has its lines leading out to all parts of the world, its trusted correspondents in every commercial centre, is entirely unknown to them. The foreign business now starting up in our machinery is, in fact, mostly done through German and Jewish merchants in New York, themselves ignorant of the merits and qualities of the machinery they are exporting.

Here is a new opening for business, which will far outweigh what we must lose at home, provided we seize upon the opportunities which offer, and patiently and steadily work for the desired end. We shall have strong competition with the seaboard Middle States, especially with Pennsylvania, which has bid high for this business through the Centennial; but she has no natural advantages over us, and it is a question of our comparative enterprise and mercantile skill.

The reports of foreign commissioners to their respective governments are stated by European papers to have produced "a most profound impression" abroad, and all prejudice against our machinery may be considered to have disappeared, and it only remains to make the advantages of our machines generally known. Every effort should be made by our machine builders to disseminate information in foreign markets, through advertisements and descriptive circulars, and to form connections with reliable foreign correspondents.

As the readiest and most effective means of making themselves known, all who can should take advantage of the next year to display their goods at the Paris Exhibition. Our Centennial has excited great interest in our labor-saving details; the reports of commissioners have established a confidence in them, and it only remains to show to the great foreign public, who will be there from all parts of the world, what we produce, to procure a very heavy trade. And it may be here suggested, that in such an exhibition the pecuniary advantages of an *associated* exposition. are very great. For example, a combination of woodworking machinery, for the making doors, sash, and blinds, could be finely exhibited at a fraction of the price that it would cost the individuals represented to exhibit by themselves; and the combined display would be infinitely more prominent and attractive.

In this matter of foreign exhibition, the State must lend its aid. The proper modes of doing this are most forcibly set forth in the report of Mr. Charles Francis Adams, Jr., Chief Commissioner of the State to the Vienna Exposition.

Speaking of the position of Mr. Owens, the English Commissioner, he continues:—

> "If Massachusetts is to be represented, . . . the work of organization should, with as little delay as possible, be intrusted to a similar agent. It would then be for him to acquaint himself thoroughly with the industries, science, and art of the State, and to put himself in correspondence with those most willing and competent to represent them. It would devolve upon him to see the plan of representation in all its parts; and to be assured of this, he must acquaint himself with the experience of other expositions. Such a labor requires qualities of patience, industry, thorough education, and, above all, great powers of organization. It calls for a familiar acquaintance with all that Massachusetts has done, and with what she is doing. To procure such an agent may not be easy; but unless he is procured, and in good time, the Legislature may rest assured that as respects confusion, waste of money, and poverty of results, the experience of Massachusetts at Philadelphia will be but a repetition, on a small scale, of that of the United States at Vienna. The idea that such an undertaking can be brought to a successful result either through the action of any committee, or by means of mellifluous oratory, enthusiastic rallies, and patriotic appeals, is wholly deceptive. It absolutely requires perfect concentration, silent work, and exclusive devotion."

To this it may be added, that "Massachusetts buildings," with restaurants, sleeping-rooms, and official and public receptions will not advance our interests in Paris one jot, so far as it relates to machinery at least. It is simply a matter of business, to be conducted on business principles. And the business is to show at Paris what we have got to sell, and to have there, with the exhibits, individuals who understand and can point out the merits of these exhibits.

All that is required of the State is to appoint a proper representative, around whom the exhibitors can unite, who will show them how they can get their exhibits to Paris most economically, and who, when there, will see that their interests are respected by the exhibition officials, and will aid their inexperience in a foreign country. Such assistance as is needed from the State can, and ought to be, furnished at a comparatively very moderate sum.* While there are many other branches of manufacture in which our wares, if known, would command a considerable foreign sale, it is, above all, those classes which were exhibited in the Machinery Hall of the Centennial, and to which this Report relates, which would attract the most attention and find the most ready market in Europe, since it is in these especially that we in the United States are unquestionably in advance of the rest of the world.

But if any action is to be taken, it should be had at once; preparation can be made in nine months at one-half the cost that it can be made in three, and indeed any action by the next Legislature would be too late to be of any use whatever in organizing our exhibition.

Such are some of the considerations suggested by our Centennial. The changes in our manufacturing relations with other sections, which have been taking place of late years, have been brought to light by the Exposition, and we must meet them by improvements in our means and methods of manufacture, and by the introduction of a higher scientific element among our manufacturers; the possibilities of new outlets for our productions have been demonstrated by that Exhibition, and we must improve every means to take advantage of these possibilities. The establishments among us which comprehend and act upon this revolution in our situation and our markets will retain and extend their business; those which do not, will go to the wall.

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* Should the United States neglect to make a national display at Paris, the advantage derived from an exhibition from our State would be still more prominent.

WORSTED GOODS.

By John C. Palfrey.

The manufacture of worsted goods is a subject of great interest and importance to Massachusetts. The extreme cold of its winters, and the sudden and great changes of weather at all seasons, make the use of wool in some form for clothes indispensable for all classes, sexes, and ages, both for comfort and health. In the beginning of the colonies the sheep were few and poor, and the home-spun cloths rude enough; but, as means and taste increased, the demand for better and better fabrics arose, and here, as throughout the civilized world, the smoothness, lustre, and durability of worsted goods brought them into request. The manufacture has been known for over five hundred years, but it was formerly so slow and expensive that it did not become common till the invention of combing machines, about twenty-five years ago. These have reached such perfection, that one machine, tended by one man, will now comb from 700 to 800 pounds per day, while, formerly, an expert comber could only comb by hand from 12 to 15 pounds per day. The result of the improvement has been a great and continued increase of worsted production. The neighborhood of Bradford is the seat of this industry in England. The value of the worsted yarns and cloths produced here in successive decades is as follows, viz.:—

1842, ...	£4,194,268	1862, ...	£9,544,344
1852, ...	6,363,230	1872, ...	27,015,291

The increase in yards or pounds would be much greater than this from the reduction in cost effected in perfecting the manufacture. A similar increase took place in France, and to a less extent in the German States; but in these countries the attention of both breeders and manufacturers was turned to shorter, finer, and softer wools than in England.

In this country the development was later and slower. It is known that sheep were pastured on the islands in Boston Harbor as early as 1633. But our first sheep were poor specimens of a mixed race, and between want and exposure, and wolves and dogs, soon ran from poor to worse. The first merino sheep were brought to this vicinity by Mr. William Foster, in 1793, and, through ignorance of their value, were eaten. The improvement of our stock began with importations of Spanish merino sheep, from 1810 to 1820, modified by Saxon sheep in 1824–6. These strains were crossed with our native sheep, usually without system, and from the irregular but finer wools thus obtained, the first attempts on a large scale at finer yarns, and delaine and similar goods of a worsted character, were made.

These were not generally very successful. During the war, the enormous consumption of woollen goods stimulated their production far beyond the average wants of the country. Mills sprang up on every hand. The importation of both wool and goods was swollen by the demand. At the end of the war the consumption fell to the needs of an exhausted people. The land was flooded with the surplus of the cheap clothing of the army. Materials for shoddy were over-abundant, and woollen mills passed from great prosperity to great adversity. This disastrous condition of affairs led to the tariff of 1867. In anticipation of this, importations were greatly increased. In 1866, the importation of manufactured woollen goods reached

$57,000,000, against an average of $23,000,000 for the five previous years. The importation of wool reached 68,000,000 pounds, against 44,000,000 for 1865, and an average of 57,000,000 for the destructive years of the war. The wool industry was paralyzed, and sheep-raisers were disheartened. In six years from 1861, the number of sheep in the United States had increased from 21,500,000, to 42,000,000. In the autumn of 1868, enough were slaughtered to reduce the number by 4,000,000; and in 1871, the total had fallen to 32,000,000.

The worsted manufacture had its full share of the disasters of the woollen. But one advantage, in the meantime, has been gained. Our manufacturers had become acquainted with the long-combing wools of Canada and England, and the stock-raisers had begun to introduce the sheep to produce them. The vigorous increase of worsted manufacture in this country sprang from these facts. Its growth has been rapid. Already, in 1870, worsted goods employed an equivalent of 670 sets of cards, out of 10,000 in the country, and the value of the worsted goods produced increased from $10,000,000 in 1866 to $22,000,000 in 1870, out of a total of $217,000,000 of manufactures of wool. There is some difficulty in obtaining information about worsted goods distinct from woollen. It is stated, however, on the best authority, that the value in England of worsted goods exported to this country was,—

1874, £2,800,000	1875, £2,280,000	1876, £1,550,000

a falling off more than made good by our own looms, it is thought.

The importations of wool from England,—probably mostly combing and delaine,—in bales, have been as follows, viz.:—

1862,	32,000
1863,	35,000
1864,	26,000
1865,	4,000
1866,	17,000
1867,	13,000
1868,	5,000
1869,	17,000
1870,	16,000
1871,	31,000
1872,	Not at hand.
1873,	17,000
1874,	27,000
1875,	35,500
1876,	29,800

These figures indicate the deficiency in our domestic supply of combing fleeces. Our production of them is steadily increasing, but not so fast as the demand for them, or the production and consumption of worsted goods.

The assortment at the Centennial Exhibition of worsted and mixed goods, dress-goods, braids, fringes, trimmings, lastings, damasks, Italian cloths, etc., from other countries, was not so large and complete as its importance to our community made desirable. There were some goods of long, fine wool, like merinos, cashmeres, etc., especially from France, of a quality not yet attempted in this country, and of unsurpassed excellence. Indeed, in fineness, softness, evenness, color, and finish, they seemed to leave nothing to desire. Carpets were well represented, with gorgeous specimens of Smyrna rugs made in the Netherlands, and hand-made Aubusson carpets. These are not produced in this country, and are too expensive to be generally used. There was a good display of English carpets, of great excellence. All grades of power-loom carpets from factories in this country were represented, from ingrain and two-ply to the best Brussels and Wilton, as well as cheaper felt, drugget, and bockings. All in their several classes seemed unsurpassed in material, workmanship, and dyes, by anything from Europe. The excellence of the Brussels and Wilton carpets especially, from the great advance made in them of late years, was remarkable and gratifying. The display of mixed dress-goods from this country was most striking for its excellence, but practically without competition, as few or no similar goods were sent from Bradford. Foreign as well as American judges, however, conceded that no similar goods were made anywhere equal to the American in material, both cotton and wool, evenness, manufacture, design, color, and finish. In this class of worsteds, as well as in carpets, some of the best displays were made by mills situated in Massachusetts. The exhibition of bunting was also a most gratifying one. At the outbreak of the war, this was not manufactured in this country. At the suggestion of the assistant secretary of the navy, its manufacture was attempted in two, at least, of the leading worsted mills of New England. The right wools were not selected, and the attempts were failures. Subsequently, the ability of another company prevailed over all difficulties, and led to important improvements over imported bunting. Its manufacture is now a well-established and most successful one. A great proportion of this fabric also is made within the borders of Massachusetts.

In machinery distinctively worsted, there was little or nothing to be seen at the Exhibition. An excellent wool-washer, useful of course for worsted work also, was exhibited by a Massachusetts maker. No combs were observed, although two new ones at least have recently been made in England. There were no preparers, gills, dandies or roving-frames, or spinning-frames, either flyer or cap. It is especially to be regretted that none of the excellent spinning-frames made in Massachusetts were exhibited. There were a few fancy looms, but none striking for novelty or merit.

The collections of wool samples, among the products of many countries, were most interesting. Notable among these were collections from nearly all the world by Messrs. Bowes & Brother of England, and by an old and prominent wool house in Boston. This display of wool of every conceivable character, and from different situations and circumstances in almost every part of the temperate zones, taught lessons of great value and concern to Massachusetts. It forced home the questions, Is the manufacture of wool in any form desirable for the State? and Can the raising of sheep be profitable here?

The first of these questions has been already answered. The nature of the soil and the dense population discourage agriculture. The leading industries are manufacturing and mercantile. In 1875, the whole number of persons employed in textile and clothing manufacture was 114,000; in all manufacturing and other mechanical industries, 316,000; in agriculture, care of animals, and fisheries, only 81,000. In the same year the products of manufactures and fisheries amounted to $596,000,000, while those of agriculture and mining were only $43,000,000. The climate calls for clothing of wool. The prosperity and taste of the people demand that much of this shall be of the best quality. The best will always be worsted of some style. The highest profits, as well as the greatest skill, generally belong to the best goods. The intelligence of our people, and their prominence in all the industrial and mechanical arts, fit them to excel in that most difficult manufacture,—the worsted. A prominent writer on wool says: "No degree of skill in the selection of other fabrics is comparable with that which must be exercised in buying and applying wool. Its preparation is more difficult, and the finish of its products is more complicated. Some branches of the wool manufacture, like that of carpets, require the most profound knowledge of the principles of the decorative art; others, like that of printing stuffs, are based upon a knowledge of the chemical arts. Indeed, it may be said that no industrial work brings so fully into play the results of scientific research, and the practical applications of art, as the vast establishments in this country which make and print the mixed dress-goods of cotton and wool."

The progress in worsted manufacture since 1867 is remarkable, and the best commentary on the system of protection then begun. Our country, for some time to come, must raise part of its revenue by duties on imports. All agree that if this must be done, it is the part of wisdom to favor those industries which are best suited to the country's resources, and the wants and capacities of its people; and which there is reasonable hope will outgrow the need of continued protection, and repay to the community the cost of their apprenticeship. This has already proved the case with standard cotton goods and calicoes. The history of worsted goods for the past ten years gives every promise of a like success. Already our carpets and mixed dress-goods are the best of their class in the world; considering their quality and durability, it is a question whether they are not already the cheapest. At the present rate of improvement it will not be long before they will certainly be better and cheaper than any foreign goods, admitted with little or no duty, while they give employment and prosperity to thousands at home instead of abroad.

In considering the advantages of raising sheep, it is evident that the profit, if any, will come from the fleeces, the mutton, and the improvement of the land.

The merino sheep and their grades thrive in enormous flocks, make poor mutton, and can be raised with great advantage and economy in climates where they have endless ranges, where they do not need to be housed at any season, and where they can graze all the year. Nature has forbidden Massachusetts to meet this competition. The sheep which produce the long combing wool, as for example the Leicester and Cotswold, and the medium delaine wool, as the Southdown, cannot, in most climates, be kept to advantage in flocks of over fifty or one hundred. They do not suffer from the cold of our winters, but need to be protected from the wet. In small numbers this calls for little addition to ordinary New England farm buildings. The expense of keeping them in the winter is in a measure offset by the superiority of wool grown under the intelligent personal care of an owner of a small number of sheep. The wool unwashed shrinks about forty to fifty per cent., so that, used where raised, it has an advantage over wool brought from a distance of nearly twice the nominal rate of freight. These sheep all thrive on poor pastures, suitably fed, and make good mutton. This is especially true of the Southdowns. There is probably no mutton in the world better than that of well-bred, well-fed Southdowns, or Leicester and Southdown crosses. Moreover, the very best mutton of all, like the best wine, is said to grow on steep, gravelly slopes, such as are plenty here. Fresh meat is usually scarce and dear in proportion to the density of population, and in large, rich cities choice mutton will always command high prices. A farmer's best market for his wool is a mill in his vicinity, and no part of the State is so remote from a large town as to make it difficult to market his mutton. Fashions in stuffs change season by season, and the same class of combing wool will not always bring the highest price. It is for the advantage of the mills to have a variety of wools to choose from, and not to have all farmers keep the same sheep. Each farmer also will be guided by his circumstances in determining what breed to select. Probably the Southdowns would prove most generally satisfactory.

As an instance of what may be done here,—in the Thirteenth Annual Report of the Secretary of the Massachusetts Board of Agriculture, 1866,—a gentleman stated that in one year he sold, in lambs and wool from twelve Cotswold and Leicester sheep, $118.19. And from one ewe he sold in one year two lambs and wool amounting to $20.

Even on high-priced land, where it is conceded, as it is in England, that it does not pay to keep sheep for wool and mutton, still the culture of sheep is an indispensable necessity, as there is no other means of keeping up the land. "The sheep is literally the basis of English husbandry." A leading English farmer "estimates that one hundred sheep, folded on an acre of land for fifteen days, would manure it sufficiently to carry it through four years' rotation of crops. In Dorsetshire and Sussex, where the Down ewes are fed in summer on the hill-grass during the day, and at night are folded on the arable without food, the value of the manure is considered one-fourth the value of the sheep. By the combination of sheep husbandry with wheat culture, lands in England which, in the time of Elizabeth produced on an average six and one-half bushels of wheat per acre, produce now over thirty bushels."

In America, one farmer gives his opinion of raising sheep in connection with grain: "With about one sheep per acre cultivated, I raise more bushels of grain on the average than when I had no sheep to turn coarse forage into manure, and to enrich the pasture for grain crops. While producing more crops on less acres, and at less cost than before I kept sheep, and at the same time constantly improving my land, I have the mutton and wool from the sheep in addition." Our agricultural reports are full of the experience of successful farmers of the merits of sheep in clearing fields of weeds and briers and brush, as manure producers and spreaders, and of their general usefulness in renovating worn-out lands when properly kept and fed.

The great obstacle to sheep-raising here is the destruction caused by ill-conditioned dogs. It seems as if this evil would be checked as soon as the importance of the culture was understood.

The ingenious first president of the Wool Manufacturers' Association has written, "The principal hindrance to the further rapid extension of worsted manufacture is the limited supply of raw material. There is nothing that would give such an impetus to the manufacture of worsted fabrics in this country as a full supply of home-grown, long-combing wool. Could our farmers, especially on the Atlantic slope, near large towns, where their mutton would find ready sale, be induced to engage more extensively in the production of such wools, I am sure they would find it a source of immediate and permanent profit. It would also be a national benefit, not only by furnishing the raw material for an important branch of manufacture, but by supplying a much-needed article of food. It is the growing of long-combing wool and its manufacture which have contributed so largely to the prosperity of England. The thirty millions of sheep which she supports are mainly such as produce this description of wool."

We conclude by asserting our firm conviction that it is the policy of Massachusetts to foster the manufacture of worsted goods to the utmost, and also the growth of domestic combing wool to supply her mills entirely.

THE FINE ARTS.

By Henry D. Williams.

The state exhibit in the Department of Fine Arts may be considered as only in a moderate degree representative or satisfactory. It was neither as large in its list of contributors, or as large in its number of contributions, as it should have been. The artists who reside within the limits of the Commonwealth were not aroused at an early date to a realization of the importance of the exhibition. Many of them did not, sufficiently in advance of the opening, become so interested as to plan new works, or to complete arrangements for the loan of such older ones as would fairly represent them. With some the question of expense was a serious matter. With incomes lessened by the depression prevalent during the year, they did not feel that the slight possibility of the sale of exhibited pictures warranted them in making an experiment at their own cost.

In sculpture there was scarcely any attempt; a plaster-cast of the "Concord Minute-Man," by D. W. French, a bust of the poet Whittier, by D. N. French, and two statuettes by Miss Anne Whitney being the only evidences offered of any skill or interest in this department. Yet no State in the Union had greater occasion for interest, or greater reason to hope for a creditable display.

Horatio Greenough, a son of Boston, was the first American sculptor, and the path which he trod to honor has found since his death many earnest artists eager to follow his steps. Mr. H. K. Brown, a pupil of Greenough, has for many years labored in bronze and marble, honored with commissions from Northern and Southern cities for commemorative statues and monuments. Mr.

Thomas Ball, by his statue of Daniel Webster in the Central Park, New York, and his equestrian figure of George Washington in the Public Garden, Boston, has taken front rank among the sculptors of our time. Mr. W. W. Story, by his statues of the "Sibyl," his "Judith," and his "Saul," has won such fame abroad as to reflect honor on his State, while the names of Miss Hosmer, Thomas Gould, and Martin Milmore, have already been honored by their works.

When we looked upon the frivolous figures which made up largely the collection of Italian sculpture in the Exhibition, we could not but regret that our own artists were not represented by some of their works. Story's "Medea," Ball's "St. John," and Miss Hosmer's "Puck," would have been a refreshing sight.

In architecture the contributions were more numerous. The Society of Architects in Boston gave its aid, and sixty-six designs were sent, representing the following architects:—

Bryant & Rogers.
Cabot & Chandler.
Cummings & Sears.
E. C. Cabot.
H. F. Clark.
Earl & Fuller.
Carl Fehmer.
F. M. Howe.
Hartwell, Swazey & Co.
C. S. Luce.
W. P. P. Longfellow.
J. A. Mitchell.
L. Newcomb & Son.
J. P. Putnam.
Henry Richards.
Sturges & Brigham.
S. J. V. Thayer.
Geo. T. Tilden.
Ware & Van Brunt.
L. W. Whitney.

The collection sent by these gentlemen included drawings of mercantile buildings erected in Boston since the great fire, the Memorial Hall, Cambridge, prominent churches, school-houses, and public buildings in New England, and city and country dwellings.

In these, evidence was given of much taste and culture.

In some was displayed marked ability in the use of the classical and renaissance styles which have been dominant, and which are still popular. In others were shown rare talent and taste in accepting the spirit of the Gothic awakening in England, and applying the principles of medieval architecture to the uses of modern business or to the present purposes of the State, the church, and the home.

In painting there was more interest evinced. Forty-nine artists contributed seventy-eight pictures, and with these were displayed twenty-six pictures by twelve deceased artists. Record should also here be made of a collection of forty-four crayons and water-colors, representing twenty-eight artists and amateurs.

It was eminently proper that in a Centennial Exhibition like that at Philadelphia, the art contribution should represent not only the productions of to-day, but by selected works of deceased artists, should present the progress of art during the national history. It is understood that the State Commission desired to secure such a series of pictures, and appointed a special committee of citizens to work in its behalf. It is to be much regretted that this wish of the Commissioners did not meet with more favor with the owners of old pictures, and that the series collected was so imperfect. The authorities of Harvard University, the Massachusetts Historical Society, the Boston Athenæum, and a few liberal-minded citizens of Boston and Cambridge, indeed, consented to loan pictures, enabling the State to exhibit a few rare and valuable historical portraits, but the response was not sufficiently general or liberal, to render the series satisfactory.

John Smybert, born in Edinburgh in 1684, coming to Boston with Bishop Berkeley in 1725 and residing there, a portrait painter till his death in 1751, was represented by portraits of Bishop Berkeley and Peter Faneuil, both loaned by the Historical Society.

John Singleton Copley, born in Boston in 1737, living there till 1774, studying art with Peter Pelham and I. B. Blackburn, and practising as a portrait painter till his departure for England, was represented by a portrait of John Adams and excellent portraits of Mr. and Mrs. Thomas Boylston, loaned by the authorities of Harvard University.

Gilbert Stuart, born in Rhode Island in 1756, but making Boston his home for the last twenty-five years of his life, dying there in 1828, was well represented by portraits of Bishop Cheverus, loaned by Mr. Horatio Greenough; of Mrs. Coffin, loaned by Mr. Nathan Appleton; of Judge Story and Fisher Ames, loaned by the authorities of Harvard University; of Mrs. Samuel Eliot, loaned by Charles W. Eliot; and of Mrs. Cushing, loaned by Mrs. L. L. Chickering.

Colonel Henry Sargent, born in Gloucester in 1770, was represented by a portrait of General Benjamin Lincoln, loaned by the Historical Society.

Washington Allston, born in South Carolina in 1779, educated in England, making Boston the home of his mature years, and ending there his career in 1843, was represented by the ideal picture of "Rosalie," loaned by Mr. Nathan Appleton; "Isaac of York" and the "Head of a Jew," loaned by the Boston Athenæum; and an "Italian Landscape," loaned by Rev. Mr. Foote.

There was also a single picture, loaned by Mr. Edward N. Perkins, entitled, "The Importunate Author," representing Gilbert Stuart Newton, who was born in 1795, dying in 1835; a portrait of Gilbert Stuart by John Neagle, born in Boston in 1799, dying in 1865, loaned by the Boston Athenæum; and a portrait of Washington Allston by Chester Harding, born in 1792, dying in 1866, loaned by Samuel Batchelder.

Meagre as this list is, it suggests something of the art of the past, and represents a few of the greatest names in our art history, by excellent examples.

The section of the collection representative of living artists contained several fine portraits. The two exhibited by Mr. William Hunt received the award of a medal by the original jury. Those exhibited by Mr. R. M. Staigg would, no doubt, have been honored, had he not, from feelings of delicacy as one of the examining committee, declined to submit them in competition. Those sent by Mr. B. C. Porter, Mr. F. D. Millet, Mr. Edgar Parker, Mr. E. T. Billings, and Mr. D. Cobb, attracted attention, and several of them were much commended.

Among the landscape painters, Mr. John R. Key received a medal from the original jury of award, for his large painting of "The Golden Gate." In the second series of awards a medal was granted to Mr. E. M. Bannister for his painting "Under the Oaks." Mr. Smith, as a member of the jury, was not allowed to exhibit in competition.

It was a matter of surprise that other Massachusetts artists were not recognized and honored. It is well known that the distribution of medals in the art department was followed by controversy, and is not now satisfactory. There is much question as to the propriety of the action of the jury of this section in establishing special rules differing from those prevailing in other departments of the exhibition. Had it been simply an art display like the Paris Salon, it might have been well, by a graded system of awards, to have given special point and honor to the grant of a medal; but in such a general exhibition as that at Philadelphia, where medals were freely distributed in other sections in recognition of meritorious contributions without exacting the highest achievement, where nearly every important application of art to manufactures was encouraged and honored, it was hardly fair that in the Fine Art Section, with the same general law in force by which only one style of medal could be given, the jury should so limit the distribution of medals that the results of their ballots and compromises would be sure to be unfair and unsatisfactory. The organization of a second jury, resulting from the dissatisfaction of the Centennial Commission with the scanty award and the early adjournment of the original jury, does not seem to have improved matters. Its awards, like those of its predecessors, appear in some way to have been governed by local interests and feeling.

It has been said that our state contribution was badly hung, and that, on this account, many of the pictures, by their unfortunate surroundings, suffered in the eyes of the judges. This, in a measure, was true, and was, no doubt, in part, the result of the haste and excitement attendant upon the last days of preparation at Philadelphia, into which such work was crowded. It, however, hardly explains the action of the juries in stopping so short in the consideration of the state display. There were certainly shown in the collection other works worthy of honor beside those selected, and several that were superior to works from other States or countries for which medals were granted.

The Italian pictures by George L. Brown; the marine paintings by William E. Norton and S. S. Tuckerman; the series of genrè works by "Champ"; the "Delft Haven Windmills," by W. Allan Gay; the "Dogs," by Thomas Hinckley; the "Anglers' Series," by Walter Brackett; the "Cattle" piece of Thomas Robinson; the familiar New England views by Benjamin Champney, Mrs. Darrah and Ernest Longfellow; the "Gulliver in Liliput," by Mark Waterman; and the "Egyptian Woman" of Hamilton Wilde, were interesting works, creditable to our local art, and worthy of commendation.

The pictures sent from Europe by artists resident abroad were also interesting. Mr. Bacon's "Boston Boys and General Gage"; the "Moonlight View of Venice," by Mr. J. J. Enneking; "Cattle," by J. F. Cole; "The Port

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of Antwerp," by D. J. Elwell; "The Italian," by C. S. Pearce; and the "Story Teller," by E. L. Weeks, were acceptable additions to the home contributions.

Other artists and pictures might be mentioned, but it would be almost equivalent to a full catalogue to do so, and as such a list was published when the pictures, in charge of the Art Club, were on view in Boston prior to their removal to Philadelphia, it is unnecessary. If we mistake not, the committee of selection commenced their labors in Boston, when fresh and earnest in their work, and by their generous rejections left the collection almost free of really poor works.

What we said in the outset with reference to the entire state art exhibit is specially true of the section of painting: it was not complete; it did not assert fully enough the position and power of our local art. There may possibly be some consolation in the thought that other localities were equally negligent. It is probably true that scarcely a country of the Old World, save England, made much effort to give a complete exhibit of its art. Certainly, if the attempt was made, it was not generally successful. Even France, Germany, and Belgium, which have found in America so many appreciative admirers of their pictures, did not adequately present the work of their greatest living artists.

Incomplete, then, as we must regard our art department, it may yet be said that there was in it sufficient to encourage and to give hope for a better future. Through it, we know that we have a number of earnest artists, devoted to their chosen profession, laboring for its advance, seeking to improve themselves, and to increase the interest of the people in art.

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